

**REPORT NUMBER: SPNCAP-CAL-18-009**

**NEW CAR ASSESSMENT PROGRAM (NCAP)  
SIDE IMPACT POLE TEST**

**Nissan Motor Co., LTD.  
2018 Nissan Rogue Sport  
SUV**

**NHTSA No: M20185205**

**PREPARED BY:  
CALSPAN CORPORATION  
P.O. BOX 400  
BUFFALO, NEW YORK 14225**



**July 20, 2018**

**FINAL REPORT**

**PREPARED FOR:  
U.S. DEPARTMENT OF TRANSPORTATION  
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION  
OFFICE OF CRASHWORTHINESS STANDARDS  
MAIL CODE: NRM-110  
1200 NEW JERSEY AVE SE, ROOM W43-410  
WASHINGTON, D.C. 20590**

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Date: July 20, 2018

Approved by: Edward Dutton  
Edward Dutton, Operations Manager  
Transportation Test Operations

Date: July 20, 2018

**FINAL REPORT ACCEPTANCE BY OCWS:**

\_\_\_\_\_  
Division Chief, New Car Assessment Program  
NHTSA, Office of Crashworthiness Standards

Date: \_\_\_\_\_

\_\_\_\_\_  
COTR, New Car Assessment Program  
NHTSA, Office of Crashworthiness Standards

Date: \_\_\_\_\_

**TECHNICAL REPORT DOCUMENTATION PAGE**

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<b>4. Title and Subtitle</b> Final Report of New Car Assessment Program Side Impact Pole Testing of a 2018 Nissan Rogue Sport SUV NHTSA No.: M20185205		<b>5. Report Date</b> July 20, 2018																												
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		<b>14. Sponsoring Agency Code</b> NRM-110																												
<b>15. Supplementary Notes</b>																														
<b>16. Abstract</b> A 32.20 km/h (20 mph), 75° oblique impact Side NCAP Test was conducted on the subject 2018 Nissan Rogue Sport SUV in accordance with the specifications of the Office of Crashworthiness Standards Side NCAP Pole Laboratory Test Procedure for the generation of consumer information on vehicle side pole crash protection. This test was conducted at Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on June 11, 2018.  The impact velocity of the vehicle was 32.61 km/h, and the ambient temperature at the struck (driver's) side of the target vehicle was 21°C. The target vehicle's maximum post-test static crush was 342 mm located at level 2 and 3. The test vehicle's occupant performance data is as follows:																														
<table border="1"> <thead> <tr> <th rowspan="2">Measurement Description</th> <th colspan="3">Driver ATD (SID-IIs) (Serial No. DG8012)</th> </tr> <tr> <th>Units</th> <th>Threshold</th> <th>Result</th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>36</sub>)</td> <td></td> <td>1000</td> <td>326.300</td> </tr> <tr> <td>Resultant Lower Spine Acceleration</td> <td>G</td> <td>82</td> <td>45.023</td> </tr> <tr> <td>Total Pelvic Force (sum of acetabular and iliac forces)</td> <td>N</td> <td>5525</td> <td>2622.907</td> </tr> <tr> <td>Maximum Thoracic Rib Deflection</td> <td>mm</td> <td>38</td> <td>24.032</td> </tr> <tr> <td>Maximum Abdomen Rib Deflection</td> <td>mm</td> <td>45</td> <td>21.095</td> </tr> </tbody> </table>				Measurement Description	Driver ATD (SID-IIs) (Serial No. DG8012)			Units	Threshold	Result	Head Injury Criteria (HIC <sub>36</sub> )		1000	326.300	Resultant Lower Spine Acceleration	G	82	45.023	Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2622.907	Maximum Thoracic Rib Deflection	mm	38	24.032	Maximum Abdomen Rib Deflection	mm	45	21.095
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The two doors on the struck side of the vehicle did not separate from the body at the hinges or latches and the opposite doors did not open during the side impact event.																														
<b>17. Key Words</b> New Car Assessment Program (NCAP) Side Impact Pole Part 572V SID-IIs		<b>18. Distribution Statement</b> Copies of this report are available from: National Highway Traffic Safety Administration Technical Information Services Division, NPO-411 1200 New Jersey Ave. SE Washington, D.C. 20590 e-mail: tis@nhtsa.dot.gov FAX: 202-493-2833																												
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## **SECTION 1**

### **TEST PURPOSE AND PROCEDURE**

This side impact test was conducted as part of the MY 2018 New Car Assessment Program Side Impact Test Program, sponsored by the National Highway Traffic Safety Administration (NHTSA), under Contract No. DTNH22-14-D-00352. The purpose of this test is to generate comparative side impact performance in a 2018 Nissan Rogue Sport SUV. The side impact test was conducted in accordance with the Office of Crashworthiness Standard's Side NCAP Pole Laboratory Test Procedure, dated October 2015.

## SECTION 2

### SUMMARY OF TEST RESULTS

A rigid pole side impact test was conducted on a 2018 Nissan Rogue Sport SUV. The subject vehicle was towed into the rigid pole at an angle of 75° and a velocity of 32.61 km/h. The test was conducted by Calspan Corporation's Transportation Test Operations facility in Buffalo, New York on June 11, 2018. Pre-test and post-test photographs of the test vehicle and side impact dummy (SID-IIs) are included in Appendix A of this report.

One Part 572V (SID-IIs) dummy was placed in the driver designated seating position according to instructions specified in the OCWS Side NCAP Pole Laboratory Test Procedure, dated October 2015. Camera locations and other pertinent camera information are included on page 3-11 in this report.

The Part 572V (SID-IIs) dummy was instrumented accordingly:

Head CG tri-axial accelerometers

Thorax upper, middle, and lower rib displacement potentiometers

Abdomen upper and lower rib displacement potentiometers

Lower spine tri-axial accelerometers

Iliac load cell

Acetabulum load cell

Appendix B contains the dummy response data. Dummy configuration and performance verification data can be found in Appendix C of this report. Appendix D identifies all serial numbers, manufacturers, and calibration dates for test equipment, dummy sensors, potentiometers, and load cells used to collect data during the test.

Injury readings for the SID-IIs dummy were recorded as follows:

#### INJURY READINGS

Measurement Description	Driver ATD (SID-IIs)		
	Units	IARV	Result
Head Injury Criteria (HIC <sub>36</sub> )		1000	326.300
Resultant Lower Spine Acceleration	g	82	45.023
Total Pelvic Force (sum of acetabular and iliac forces)	N	5525	2622.907
Maximum Thoracic Rib Deflection	mm	38*	24.032
Maximum Abdominal Rib Deflection	mm	45*	21.095

\*Proposed IARV

Supplemental restraint information was recorded as follows:

**SUPPLEMENTAL RESTRAINT INFORMATION**

Restraint Type	Left Front (Driver) Occupant Location 1		Left Rear (Passenger) Occupant Location 4	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	No	N/A		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

**GENERAL COMMENTS:**

1. P1 serial number – DG8012

**Data Anomalies:**

- Left Sill B-Pillar Y Acceleration, Exceeded calibration range at 13.4ms

**SECTION 3**  
**OCCUPANT AND VEHICLE INFORMATION**

This section contains information reporting for the following Data Sheets:

Data Sheet No. 1 – General Test and Vehicle Parameter Data

Data Sheet No. 2 – Seat, Seat Belt, Steering Wheel Adjustment and Fuel Systems Data

Data Sheet No. 3 – Dummy Longitudinal Clearance Dimensions

Data Sheet No. 4 – Dummy Lateral Clearance Dimensions

Data Sheet No. 5 – Camera and instrumentation Data

Data Sheet No. 6 – Vehicle Accelerometer Data

Data Sheet No. 7 – Rigid Pole Load Cell Data

Data Sheet No. 8 – Post-Test Observations

Data Sheet No. 9 – Test Vehicle Profile Measurements

Data Sheet No. 10 – Test Vehicle Exterior Crush Measurements

Data Sheet No. 11 – Vehicle Damage Profile Distances

Data Sheet No. 12 – FMVSS No. 301 Static Rollover Results

Data Sheet No. 13 – Dummy / Vehicle Temperature and Humidity Stabilization Data

**DATA SHEET NO. 1  
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA No.	M20185205
Model Year	2018
Make	Nissan
Model	Rogue Sport
Body Style	SUV
VIN	JN1BJ1CP1JW104907
Body Color	Gray
Odometer Reading (km/mi)	21
Engine Displacement (L)	2.0
Type / No. Cylinders	I4
Engine Placement	Transverse
Transmission Type	Automatic
Transmission Speeds	CVT
Overdrive	Yes
Final Drive	FWD
Roof Rack	No
Sunroof / T-Top	No
Running Boards	No
Tilt Steering Wheel	Yes
Power Seats	No
Anti-Lock Brakes (ABS)	Yes

Traction Control System (TCS)	Yes
Auto-Leveling System	No
Automatic Door Locks (ADL)	Yes
Power Window Auto-Reverse	No
Other Optional Feature	--
Driver Front Airbag	Yes
Driver Curtain Airbag	Yes
Driver Head/Torso Airbag	No
Driver Torso Airbag	No
Driver Torso / Pelvis Airbag	Yes
Driver Pelvis Airbag	No
Driver Knee Airbag	No
Rear Pass. Curtain Airbag	Yes
Rear Pass. Head / Torso Airbag	No
Rear Pass. Torso Airbag	No
Rear Pass. Torso / Pelvis Airbag	No
Rear Pass. Pelvis Airbag	No
Driver Seat Belt Pretensioner	Yes
Rear Pass. Seat Belt Pretensioner	No
Driver Load Limiter	Yes
Rear Pass. Load Limiter	No
Other Safety Restraint	No

Does owner's manual provide instructions to turn off automatic door locks?

No

**DATA FROM CERTIFICATION LABEL**

Manufactured By	Nissan Motor Co. LTD
Date of Manufacture	11/17
Vehicle Type	Passenger Car

GVWR (kg)	1969
GAWR Front (kg)	1054
GAWR Rear (kg)	930

**VEHICLE SEATING AND WEIGHT CAPACITY DATA**

Measured Parameter	Front	Rear	Third	Total
Designated Seating Capacity (DSC)	2	3	-	5
Capacity Weight (VCW) (kg)				408
DSC X 68.04 kg				340.2
Cargo Weight (RCLW) (kg)				67.8

(A)

(B)

(A-B)

**VEHICLE SEAT TYPE**

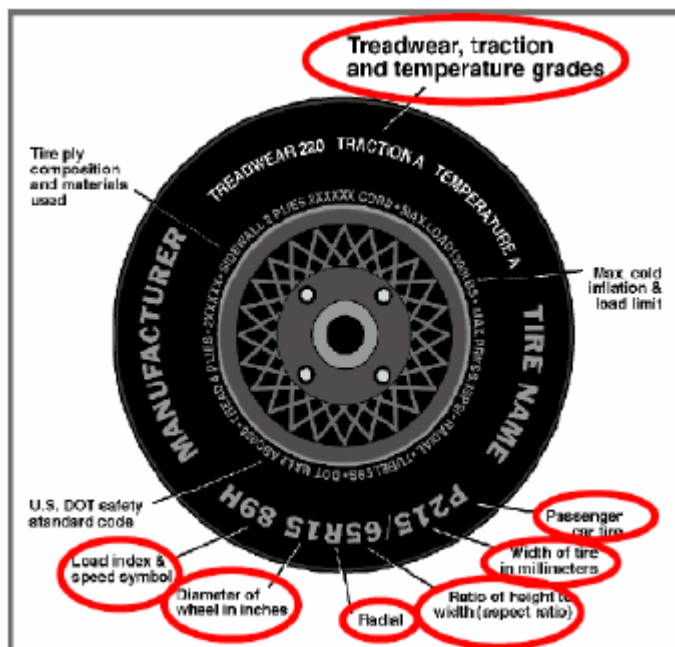
Seating Location	Type of Seat Pan				Type of Seat Back		
	Bucket	Bench	Split Bench	Contoured	Fixed	Adjustable	
						W/ Lever	W/ Knob
Front Seat	X					X	
Rear or Second Row Seat			X		X		
Third Row seat							

**DATA SHEET NO. 1 ... (CONTINUED)**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

*Collected for year, make, model, & VIN, all items circled in red, tire manufacturer and tire name.*



**VEHICLE TIRE INFORMATION**

Measured Parameter	Front	Rear
Maximum Tire Pressure (kPa)	350	350
Cold Pressure (kPa)	230	230
Recommended Tire Size	215/65R16	215/65R16
Tire Size on Vehicle	215/65R16	215/65R16
Tire Manufacturer	Yokohama	Yokohama
Tire Model	Geolander	Geolander
Treadwear	280	280
Traction	B	B
Temperature Grades	A	A
Tire Plies Sidewall	2 Polyester	2 Polyester
Tire Plies Body	2 Steel, 2 Polyester, 2 Nylon	2 Steel, 2 Polyester, 2 Nylon
Load Index/Speed Symbol	98H	98H
Tire Material	Rubber	Rubber
DOT Safety Code Left	FDHB PMC 4417	FDHB PMC 4417
DOT Safety Code Right	FDHB PMC 4417	FDHB PMC 4417

**DATA SHEET NO. 1 ... (CONTINUED)  
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
Test Date: 6/11/2018

**TIRE PRESSURES**

	Units	LF	RF	LR	RR
As Delivered	kPa	293	294	293	292
Tire Placard	kPa	230	230	230	230
Owner's Manual	kPa	230	230	230	230
As Tested	kPa	230	230	230	230

**TEST VEHICLE AXLE WEIGHTS**

	Units	As Delivered (UVW)			As Tested (ATW)			Fully Loaded		
		Front	Rear	Total	Front	Rear	Total	Front	Rear	Total
Left	kg	444	297		463	346		463	353	
Right	kg	431	288		434	328		434	332	
Ratio	%	60	40		57	43		57	43	
Totals	kg	875	585	1460	897	674	1571	897	685	1582

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value	
Total As Delivered Weight (UVW)	kg	1460	(A)
Actual Weight of 1 P572V (SID-ILs) ATD Used	kg	51	(B)
Rated Cargo / Luggage Weight (RCLW)	kg	67.8	(C)
Calculated Vehicle Target Weight (TVTW)	kg	1578.8	(A+B+C)

Does the measured As Test Vehicle Weight lie within the required weight range (i.e. Calculated Test Vehicle Target Weight – 4.5 kg to – 9 kg)?  Yes  No

**TEST VEHICLE ATTITUDES AND CG**

Measurement Description	Units	As Delivered	As Tested	Fully Loaded	Meets Rqmt***
Driver Door Sill Angle (front-to-rear)*	Deg	-0.95	-0.90	-0.80	Yes
Front Passenger Sill Angle (front-to-rear)*	Deg	-1.05	-0.90	-0.85	Yes
Front Bumper-Line Angle (left-to-right)**	Deg	-0.05	-0.10	-0.10	Yes
Rear Bumper-Line Angle (left-to-right)**	Deg	-0.05	-0.10	-0.10	Yes
Vehicle CG (Aft of Front Axle)	mm	1060	1135	1145	
Vehicle CG (Left (+) / Right (-) from Longitudinal Centerline)	mm	12	24	25	

\* ND = Nose Down (-), NU = Nose Up (+)

\*\* LD = Left Down (-), LU = Left Up (+)

\*\*\* The "As Tested" vehicle attitude measurements must be equal to or between the "As Delivered" and "Fully Loaded" vehicle attitude measurements. Indicate "Yes" or "No" for Meets Requirement"

**DATA SHEET NO. 1 ... (CONTINUED)**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

**WEIGHT OF BALLAST AND VEHICLE COMPONENTS REMOVED TO MEET TVTW**

Component Description	Weight (kg)
Trunk Carpeting	9
Spare Tire	13
Jack	3
Tail Light	1
Passenger Windows and door parts	8
Ballast / Equipment Added	45

Test Height – Adjustable Suspension Setting, if Applicable	N/A
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**DATA SHEET NO. 2**  
**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

**SEAT POSITIONING**

*The driver's seat, front center seat (if applicable), and right front passenger's seat should be set to the forward-most, mid-height, mid-angle position. The struck-side rear passenger's seat, rear center seat, and non-struck side rear passenger's seats should be set to the rear-most, lowest, mid-angle position.*

**SCRL ANGLE RANGE**

Seat	SCRL (°)		
	Max	Min	Mid
Driver Seat	14.8	11.6	13.2
Front Passenger Seat	Not Adjustable		
Front Center Seat	N/A	N/A	N/A
Struck Side Rear Seat	Fixed	Fixed	Fixed
Non-Struck Side Rear Seat	Fixed	Fixed	Fixed
Rear Center Seat	Fixed	Fixed	Fixed

**SEAT HEIGHT AND ANGLE**

Seat	As Tested SCRL Angle (Mid) (°)	As Tested SCRP Height (mm)	SCRP Height Position	SCRP Height (mm)		
				Rearmost	Mid-Fore / Aft	Forward-Most
Driver Seat	13.2	18	Max	-	-	-
			Mid	0	9	18
			Min	-	-	-
Front Passenger Seat	Not Adjustable		Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Front Center Seat	N/A	N/A	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Non-Struck Side Rear Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-
Rear Center Seat	Fixed	Fixed	Max	-	-	-
			Mid	-	-	-
			Min	-	-	-

**DATA SHEET NO. 2 ... (CONTINUED)**  
**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

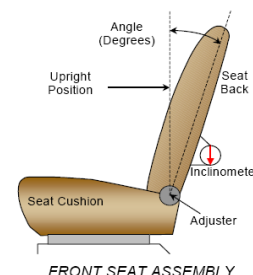
NHTSA No.: M20185205  
 Test Date: 6/11/2018

**SEAT FORE / AFT POSITION**

Seat	Total Fore / Aft Travel		Test Position from Forward most Position	
	mm	Detents*	mm	Detents*
Driver Seat	240	25 (0-24)	0	0
Front Passenger Seat	240	25 (0-24)	0	0
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

**SEAT BACK ANGLE ADJUSTMENT**

The driver's seat back is positioned such that the dummy's head is level. The front center and front passenger's seat backs are positioned in a similar manner as the driver's seat back. The struck-side rear passenger seat back is positioned in accordance with the information provided by the manufacturer on Form No. 1 for the 5<sup>th</sup> percentile female dummy in a Side NCAP MDB test. The rear center and non-struck side rear passenger's seat back are set to match the struck-side rear seat back.



Seat	Total Seat Back Angle Range		Test Position from Most Upright	
	Degrees	Detents*	Degrees	Detents*
Driver Seat w/Seated Dummy	67.1	N/A	-4.7	N/A
Front Passenger Seat	66.9	N/A	-4.0	N/A
Front Center Seat	N/A	N/A	N/A	N/A
Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Non-Struck Side Rear Seat	FIXED	FIXED	FIXED	FIXED
Rear Center Seat	FIXED	FIXED	FIXED	FIXED

**SEAT BELT ANCHORAGE ADJUSTMENT**

Seat belt anchorages are adjusted in accordance with the information provided by the manufacturer on Form No. 1. Zero is defined as the uppermost detent

Seat	Total # of Positions	Placed in Position #
Driver Seat	4	0 – Uppermost

**HEAD RESTRAINT ADJUSTMENT**

The driver's head restraint is adjusted to the lowest and most full forward in-use position.

Seat	Total # of Positions	Placed in Position #
Driver Seat	3	Lowest

**DATA SHEET NO. 2 ... (CONTINUED)**  
**SEAT, SEAT BELT, STEERING WHEEL ADJUSTMENT AND FUEL SYSTEMS DATA**

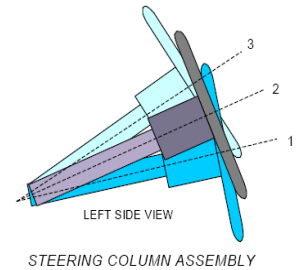
Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

**STEERING COLUMN ADJUSTMENT**

*Steering wheel and column adjustments are made so that the steering wheel hub is at the center of its geometric locus it describes when it moves through its full range of motion.*

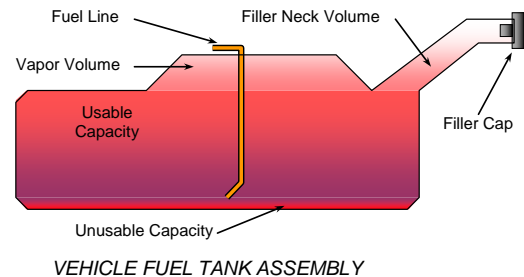
	<b>Degrees</b>	<b>Fore / Aft Position (mm)</b>
Lowermost – Position 1	23.8	
Geometric Center – Position 2	25.9	
Uppermost – Position 3	28.0	
Telescoping Steering Wheel Travel		48
Test Position	25.9	24



**FUEL PUMP**

*Describe the fuel pump type, details about how it operates, and the location of the fuel filler neck.*

The vehicle is equipped with an electric fuel pump.  
The fuel filler neck is on the right side of the vehicle.  
The pump creates positive pressure in the fuel lines, pushing the gasoline to the engine. See form 1 for more information.



**FUEL TANK CAPACITY DATA**

<b>Description</b>	<b>Liters</b>
Usable Capacity of "Standard Tank" - see Form No. 1	54.8
Usable Capacity of "Optional Tank" - see Form No. 1	N/A
Usable Capacity of "Standard Tank" - see Owner's Manual	54.8
Usable Capacity of "Optional Tank" - see Owner's Manual	N/A
93% of Usable Capacity	50.9
Actual Amount of Solvent Used in Test	50.9
1/3 of Usable Capacity	18.2

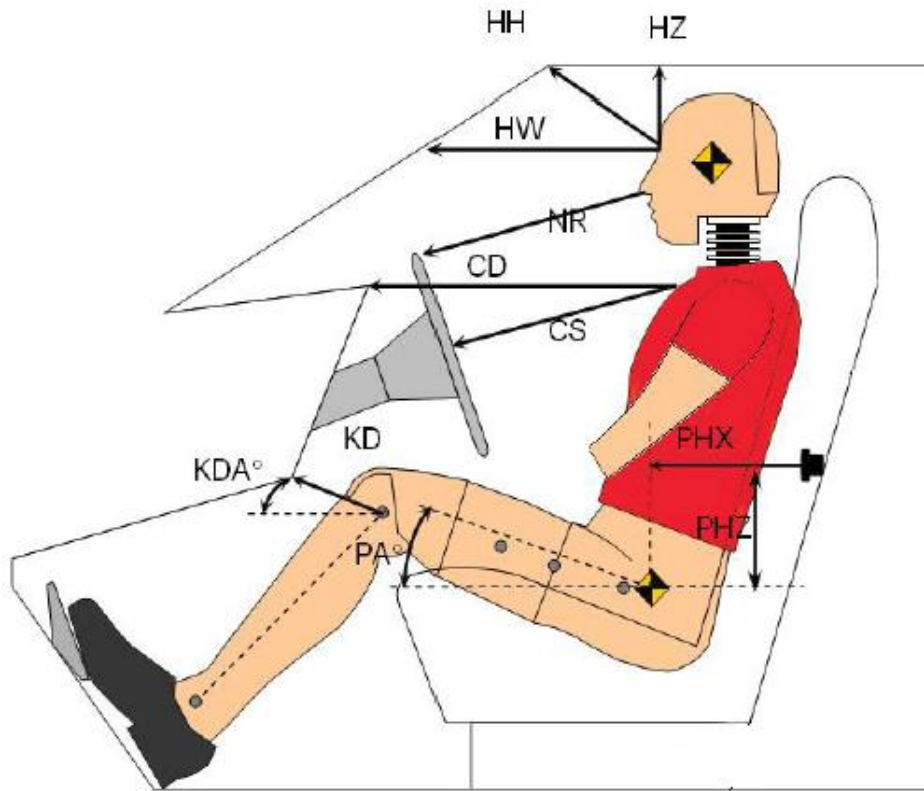
Is the Actual Amount of Solvent Used in the test equal to 93% ±1% of the Usable Capacity stated in Form No. 1?

Yes  No

**DATA SHEET NO. 3  
DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018



**Left Side View**

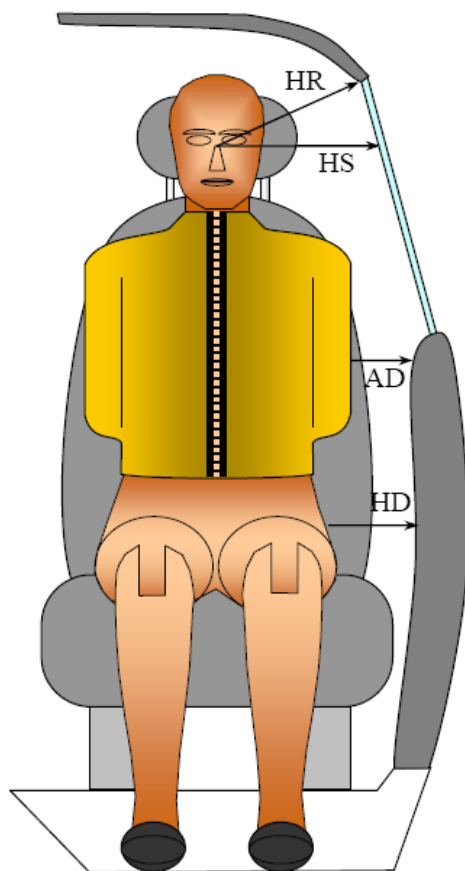
**DUMMY LONGITUDINAL CLEARANCE DIMENSION INFORMATION**

Driver Code	Description	Driver (Serial No. DG8012)	
		Length (mm)	Angle (°)
HH	Head to Header	237	
HW	Head to Windshield	575	
HZ	Head to Roof Liner	161	
NR	Nose to Rim	237	
CD	Chest to Dash	401	
CS	Chest to Steering Wheel	165	
KD(L) / KDA(L)°	Left Knee to Dash	97	23.9
KD(R) / KDA(R)°	Right Knee to Dash	95	22.9
PAX°	Pelvic Tilt Angle (X-Axis)		21.8
PAY°	Pelvic Tilt Angle (Y-Axis)		0.3
PHX	Hip Point to Striker (X-Axis)	392	
PHZ	Hip Point to Striker (Z-Axis)	93	

**DATA SHEET NO. 4  
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018



*FRONT VIEW OF DUMMY*

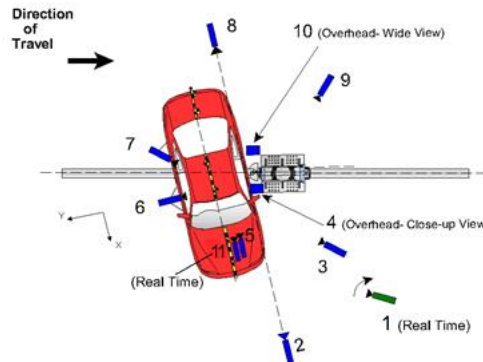
**DUMMY LATERAL CLEARANCE DIMENSION INFORMATION**

<b>Code</b>	<b>Measurement Description</b>	<b>Units</b>	<b>Driver - Length (Serial No. DG8012)</b>
HR	Head To Side Header	mm	238
HS	Head to Side Window	mm	358
AD	Arm to Door	mm	123
HD	Hip Point to Door	mm	163

**DATA SHEET NO. 5  
CAMERA AND INSTRUMENTATION DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018



**CAMERA LOCATIONS AND DATA**

No.	Camera View	Coordinates (mm)			Lens Length (mm)	Operating Frame Rate (fps)
		X	Y	Z		
1	Real-time (24 - 30 fps) pan view of impact				Zoom	60
2	Front ground level - impact view	8455	0	-1318	24	1000
3	Impact side 45° - forward pole view	4914	-1359	-1845	24	1000
4	Overhead Close-up view of impact	0	0	-9375	35	1000
5	Onboard - dummy front view				25	1000
6	Onboard - dummy side view				12.5	1000
7	Onboard - dummy rear oblique view				12.5	1000
8	Rear ground level - impact view	-8175	0	-1392	24	1000
9	Impact side 45° - rearward pole view	-3281	-3664	-1736	24	1000
10	Overhead wide - view of impact	0	0	-9375	24	1000
11	Real-time (24 - 30 fps) - dummy front view				Zoom	60

Notes: Reference - From Point of Impact for X and Y; from Ground for Z  
 +X = Forward of vehicle, +Y = Right of vehicle, +Z = Down  
 \* All measurements accurate to ± 6 mm. Vehicle is at a 75° angle to the rigid pole.

Comments: All cameras operated as intended.

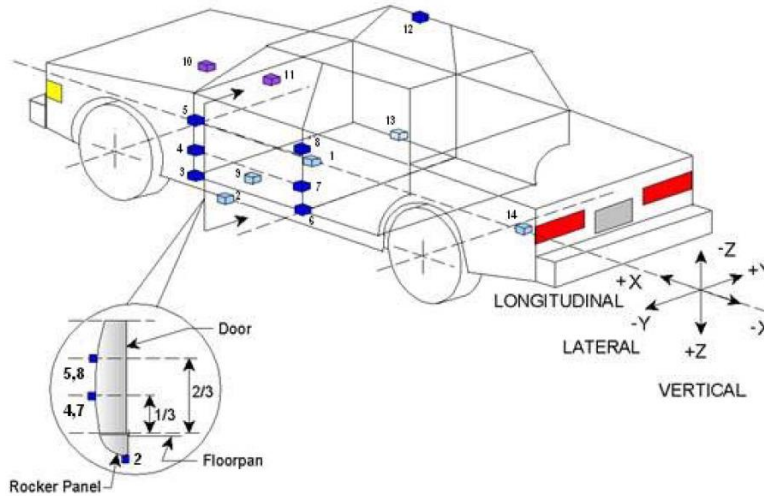
**INSTRUMENTATION**

Description	Number of Channels
Driver Dummy Channels	16
Vehicle Structure Accelerometers	18
Pole Load Cells	8
<b>Total</b>	<b>42</b>

**DATA SHEET NO. 6  
VEHICLE ACCELEROMETER DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018



**TEST VEHICLE ACCELEROMETER LOCATIONS**

No.	Accelerometer Location	Coordinates (mm)		
		X	Y	Z
1	Vehicle CG	2232	-6	-107
2	Left Floor Sill	2571	-636	152
3	A-Pillar Sill	2943	-620	100
4	A-Pillar Low	3008	-614	-99
5	A-Pillar Mid	2978	-614	-610
6	B-Pillar Sill	1964	-687	51
7	B-Pillar Low	1922	-672	-251
8	B-Pillar Mid	1885	-661	-483
9	Driver Seat Track	1983	-546	113
10	Engine Top	3628	383	-363
11	Firewall	3208	362	-278
12	Right Roof	2051	531	-1055
13	Right Floor Sill	2593	638	147
14	Rear Floorpan	886	-9	-45

Reference: X – Rear surface of vehicle (+ forward)  
 Y – Vehicle centerline (+ to right)  
 Z – Ground plane (+ down)

**DATA SHEET NO. 7  
RIGID POLE LOAD CELL DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
Test Date: 6/11/2018

**POLE BARRIER**



**RIGID POLE LOAD CELL LOCATIONS**

<b>ID</b>	<b>Units</b>	<b>Height From Ground</b>
1	mm	200
2	mm	590
3	mm	750
4	mm	1075
5	mm	1260
6	mm	1740
7	mm	1920
8	mm	2300

**DATA SHEET NO. 8  
POST-TEST OBSERVATIONS**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

**TEST DUMMY INFORMATION AND CONTACT POINTS**

Dummy Body Part	Driver Seat Dummy (SID-IIs)
Face	Curtain Airbag
Top of Head	Curtain Airbag & Head Rest
Left Side of Head	Curtain Airbag
Back of Head	Curtain Airbag & Headrest
Left Shoulder	Curtain & Torso/Pelvis Airbag & Seatback
Upper Torso	Seatback & Torso/Pelvis Airbag
Lower Torso	Seatback & Torso/Pelvis Airbag
Left Hip	Seatpan & Torso/Pelvis Airbag
Left Knee	None

**POST-TEST DOOR PERFORMANCE**

Description	Struck Side		Non-Struck Side		Rear Hatch/ Other
	Front	Rear	Front	Rear	
Remained Closed and Operational	No	No	Yes	Yes	Yes
Total Separation from Vehicle at Hinges or Latches	No	No	No	No	No
Latch or Hinge Systems Pulled Out of Their Anchorages	No	No	No	No	No
Disengaged from Latched Position	No	No	No	No	No
Latch Separated from Striker	No	No	No	No	No
Jammed Shut	Yes	Yes	No	No	No
If Door Opened at Striker, Width of Opening at Striker (mm)	0	0	0	0	0

**POST-TEST SEAT PERFORMANCE**

Description	Struck Side		Non-Struck Side	
	Front	Rear	Front	Rear
Seat Movement Along Seat Track	No	No	No	No
Seat Disengagement from Floor Pan	No	No	No	No
Seat Back Movement from Initial Position	No	No	No	No
Seat Back Collapse	No	No	No	No

**DATA SHEET NO. 8 ... (CONTINUED)  
POST-TEST OBSERVATIONS**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

**POST-TEST STRUCTURAL OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Pillar Performance	A Pillar Buckled
Sill Separation	None
Windshield Damage	Cracks Throughout
Side Window Damage	Driver Window Shattered
Other Notable Effects	None

**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

Restraint Type	Struck Side Driver		Struck Side Rear Passenger	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	No		
Knee Airbag	No	N/A		
Side Airbag 1 - Curtain	Yes	Yes	Yes	Yes
Side Airbag 2 – Torso/Pelvis	Yes	Yes	No	N/A
Seat Belt Pretensioner	Yes	Yes	No	N/A
Seat Belt Load Limiter	Yes	Yes	No	N/A
Other				

**VEHICLE SPEED, VEHICLE ANGLE AT IMPACT AND IMPACT POINT LOCATION DATA**

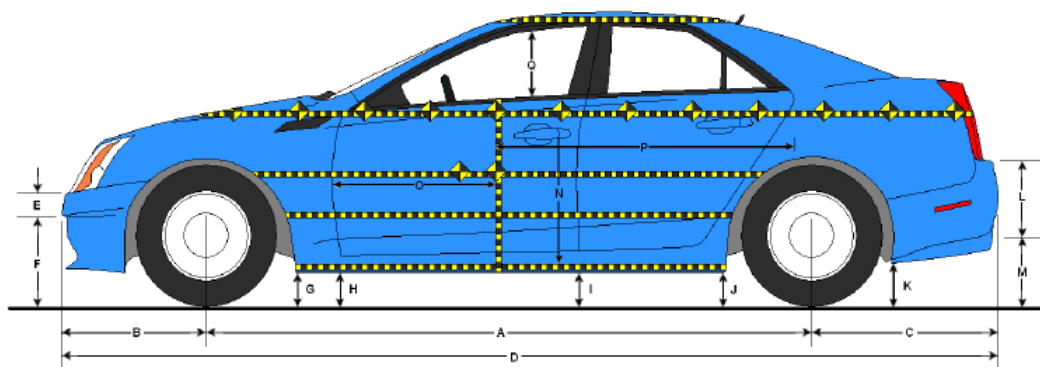
Measured Parameter	Units	Tolerance	Value
Vertical Impact Ref Line - Aft of Front Axle, Intended Impact Pt	mm		1065
Actual Impact Point - Aft of Front Axle	mm		1056
Horizontal Offset (+ forward / - rearward)	mm	+/- 38 *	+9
Angle Between Vehicle's Longitudinal Centerline and Line of Forward Motion	deg	75 +/- 3	75.0
Trap No. 1 Velocity - Primary	kph	31.4 to 33.0	32.61
Trap No. 2 Velocity - Redundant	kph	31.4 to 33.0	32.62

\* Of Intended Impact Point

**DATA SHEET NO. 9**  
**TEST VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
Test Date: 6/11/2018



LEFT SIDE VIEW

**VEHICLE PRE- AND POST-TEST MEASUREMENT INFORMATION**

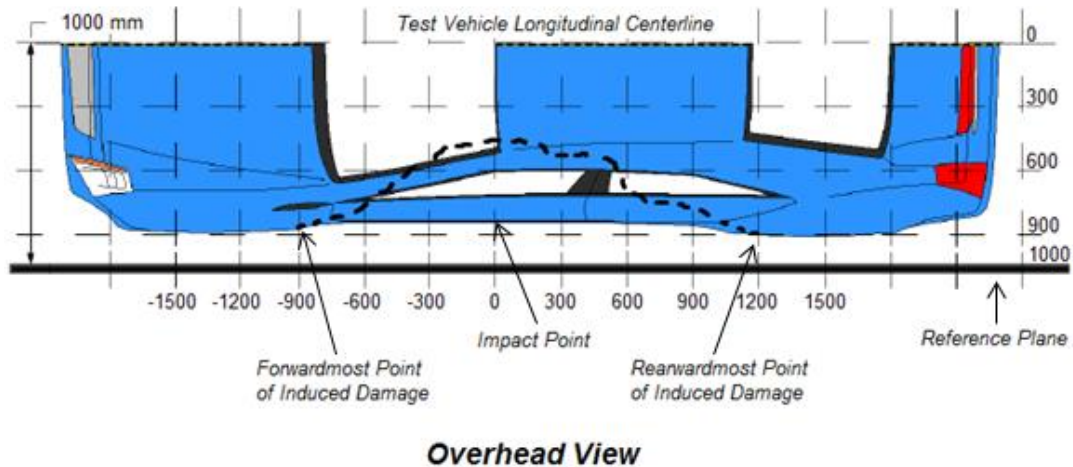
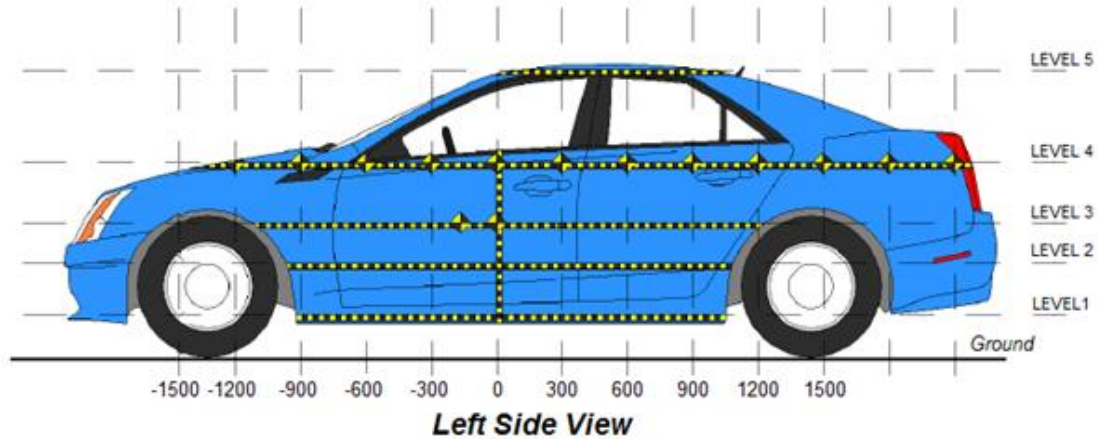
Code	Description	Pre-Test	Post-Test	Difference
A	Vehicle Wheelbase	2645	2559	86
B	Front Axle to FSOV	900	934	-34
C	Rear Axle to RSOV	832	828	4
D	Total Length at Centerline	4376	4321	55
E	Front Bumper Thickness	160	165	-5
F	Front Bumper Bottom to Ground	471	501	-30
G	Sill Height at Front Wheel Well	295	290	5
H	Sill Height at Front Door Leading Edge	291	281	10
I	Sill Height at B-Pillar	294	303	-9
J1	Sill Height at Rear Wheel Well	305	312	-7
J2	Pinch Weld Height at Rear Wheel Well	269	273	-4
K	Sill Height Aft of Rear Wheel Well	329	322	7
L	Rear Bumper Thickness	235	235	0
M	Rear Bumper Bottom to Ground	448	435	13
N	Sill Height to Bottom of Front Window Sill	783	787	-4
O	Front Door Leading Edge to Impact CL	590	498	92
P	Rear Door Trailing Edge to Impact CL	1488	1400	88
Q	Front Window Opening	410	400	10
R	Right Side Length	4298	4287	11
S	Left Side Length	4299	4223	76
T	Vehicle Width at B-Pillars	1790	1691	99

\* All measurements in mm with tolerance of  $\pm 3$ mm

**DATA SHEET NO. 10**  
**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018



**MAXIMUM EXTERIOR CRUSH MEASUREMENTS**

Level	Measurement Description	Units	Height Above Ground	Maximum Exterior Static Crush	Distance from Impact
1	Sill Top	mm	371	307	0
2	Occupant Hip Point	mm	678	342	0
3	Mid - Door	mm	734	342	0
4	Window Sill	mm	1050	280	0
5	Window Top	mm	1518	113	150

**NOTE:** The above measurements should be taken along the vertical impact reference line. Vehicle measurements forward of the vertical impact reference line are negative.

**DATA SHEET NO. 10 ... (CONTINUED)**  
**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

**EXTERIOR CRUSH MEASUREMENTS AT EACH LEVEL**

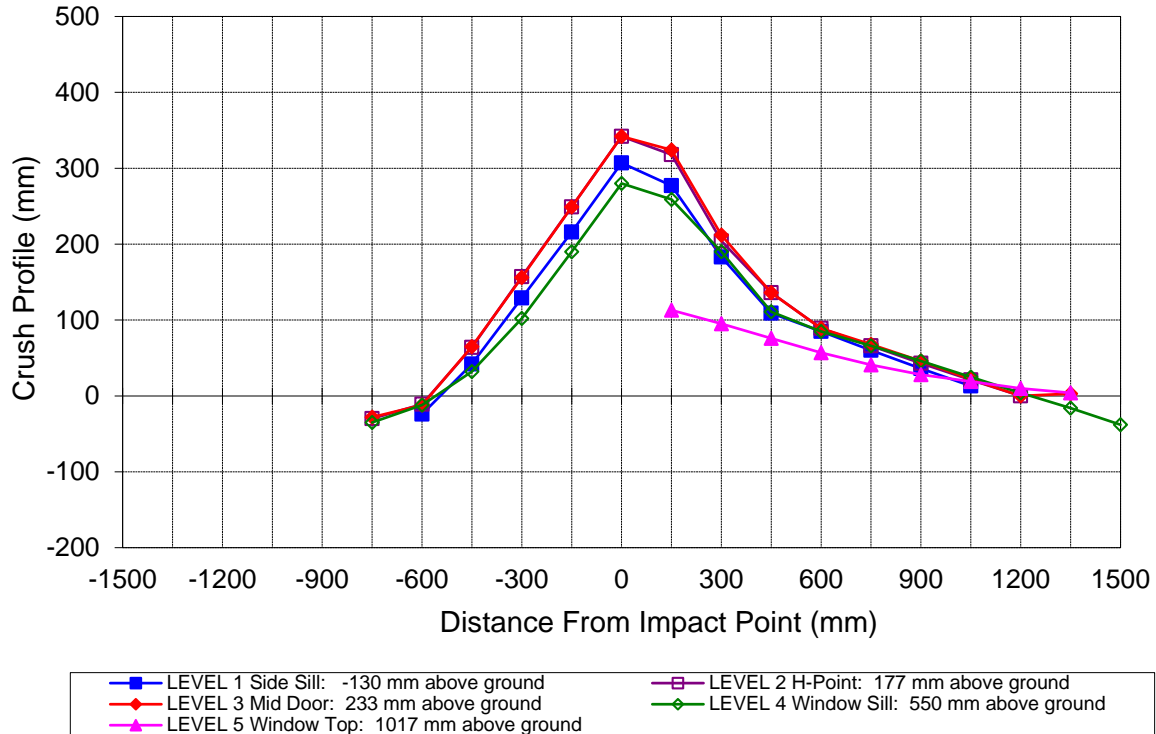
	Pre-Test					Post-Test					Difference				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
-1500															
-1350															
-1200															
-1050															
-900															
-750		904	901	828			934	929	863			-30	-28	-35	
-600	900	899	897	817		924	910	909	829		-24	-11	-12	-12	
-450	896	892	893	808		854	828	828	776		42	64	65	32	
-300	893	892	894	812		764	735	738	710		129	157	156	102	
-150	890	893	896	818		674	644	647	628		216	249	249	190	
0	887	893	897	825		580	551	555	545		307	342	342	280	
150	883	892	897	831	630	606	574	573	572	517	277	318	324	259	113
300	880	891	896	836	636	697	687	684	646	541	183	204	212	190	95
450	877	890	895	839	636	768	754	759	728	560	109	136	136	111	76
600	874	888	892	842	634	789	799	803	757	577	85	89	89	85	57
750	878	886	890	844	629	818	820	822	778	588	60	66	68	66	41
900	882	887	888	845	621	846	844	842	799	593	36	43	46	46	28
1050	886	894	893	845	610	873	873	871	820	591	13	21	22	25	19
1200		898	899	853	591		898	899	849	581		0	0	4	10
1350			905	864	561			902	880	557			3	-16	4
1500				869					907					-38	

**NOTE:** Pre-test measurements are taken when the vehicle is in the “As Tested” weight condition. Vehicle measurements forward of the vertical impact reference line are negative. The crush profile grid is established prior to the test based on an estimated impact point. The final distance from impact is determined after the final dummy positioning and the pole is aligned with the center of gravity of the dummy’s head.

**DATA SHEET NO. 10 ... (CONTINUED)**  
**TEST VEHICLE EXTERIOR CRUSH MEASUREMENTS**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018



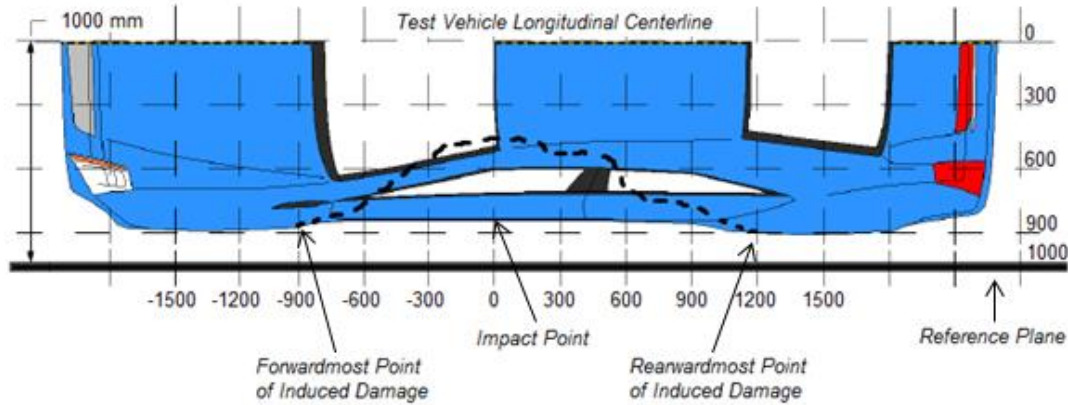
**Vehicle Exterior Crush Measurements - Visual Representation**

**DATA SHEET NO. 11  
VEHICLE DAMAGE PROFILE DISTANCES**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018

For guidance regarding damage profile distance measurements, please refer to the latest version of the *NHTSA Test Reference Guide, Volume 1: Vehicle Tests*.



**Overhead View**

**VEHICLE DAMAGE PROFILE DISTANCES**

DPD	Distance From Impact Point (mm)	Level	Post-Test (mm)	Pre-Test (mm)	Crush (mm)
1	-750	3	71	99	-28
2	-330	3	244	106	138
3	90	3	434	103	331
4	510	3	223	106	117
5	930	3	152	111	41
6	1350	3	98	95	3

**DATA SHEET NO. 12  
FMVSS NO. 301 STATIC ROLLOVER RESULTS**

Test Vehicle:	<u>2018 Nissan Rogue Sport SUV</u>	NHTSA No.:	<u>M20185205</u>
Test Program:	<u>NCAP Side MDB Impact Test</u>	Test Date:	<u>6/11/2018</u>
Test Time:	<u>10:14 AM</u>	Temperature:	<u>21° C</u>

- A. From impact until vehicle motion ceases: 0 oz.  
(Maximum allowable is 1 oz.)
- B. For the 5-minute period after motion ceases: 0 oz.  
(Maximum allowable is 5 oz.)
- C. For the following 25 minutes: 0 oz.  
(Maximum allowable is 1 oz./minute)
- D. Spillage Details: No Spillage Occurred

**FMVSS NO. 301 STATIC ROLLOVER DATA**



**ROLLOVER SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	74	300	374
90° to 180°	62	300	362
180° to 270°	62	300	362
270° to 360°	72	300	372

**FMVSS NO. 301 ROLLOVER SPILLAGE TABLE**

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eighth Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

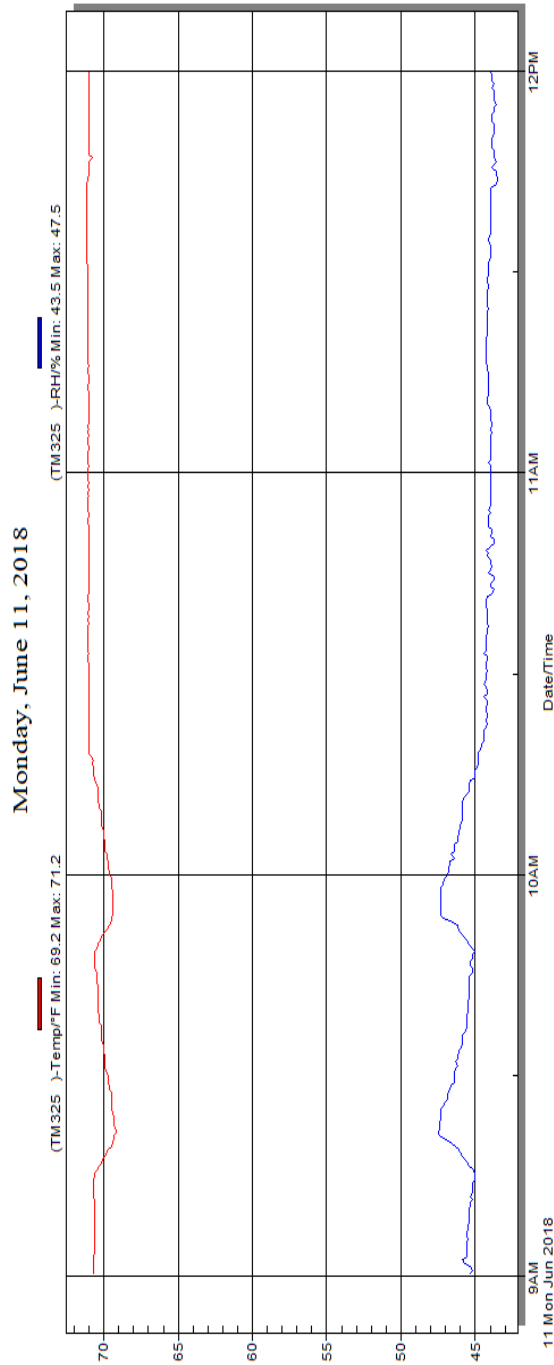
**ROLLOVER SOLVENT SPILLAGE LOCATION TABLE**

Test Phase	Spillage Location
0° to 90°	No Spillage Occurred
90° to 180°	No Spillage Occurred
180° to 270°	No Spillage Occurred
270° to 360°	No Spillage Occurred

**DATA SHEET NO. 13**  
**DUMMY / VEHICLE TEMPERATURE AND HUMIDITY STABILIZATION DATA**

Test Vehicle: 2018 Nissan Rogue Sport SUV  
 Test Program: NCAP Side Pole Impact Test

NHTSA No.: M20185205  
 Test Date: 6/11/2018



**Temperature and Humidity Stabilization Chart / Data for Dummies and Test Vehicle**

**APPENDIX A**  
**PHOTOGRAPHS**

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<b>Fig.</b>	<b>Description</b>	<b>Page</b>
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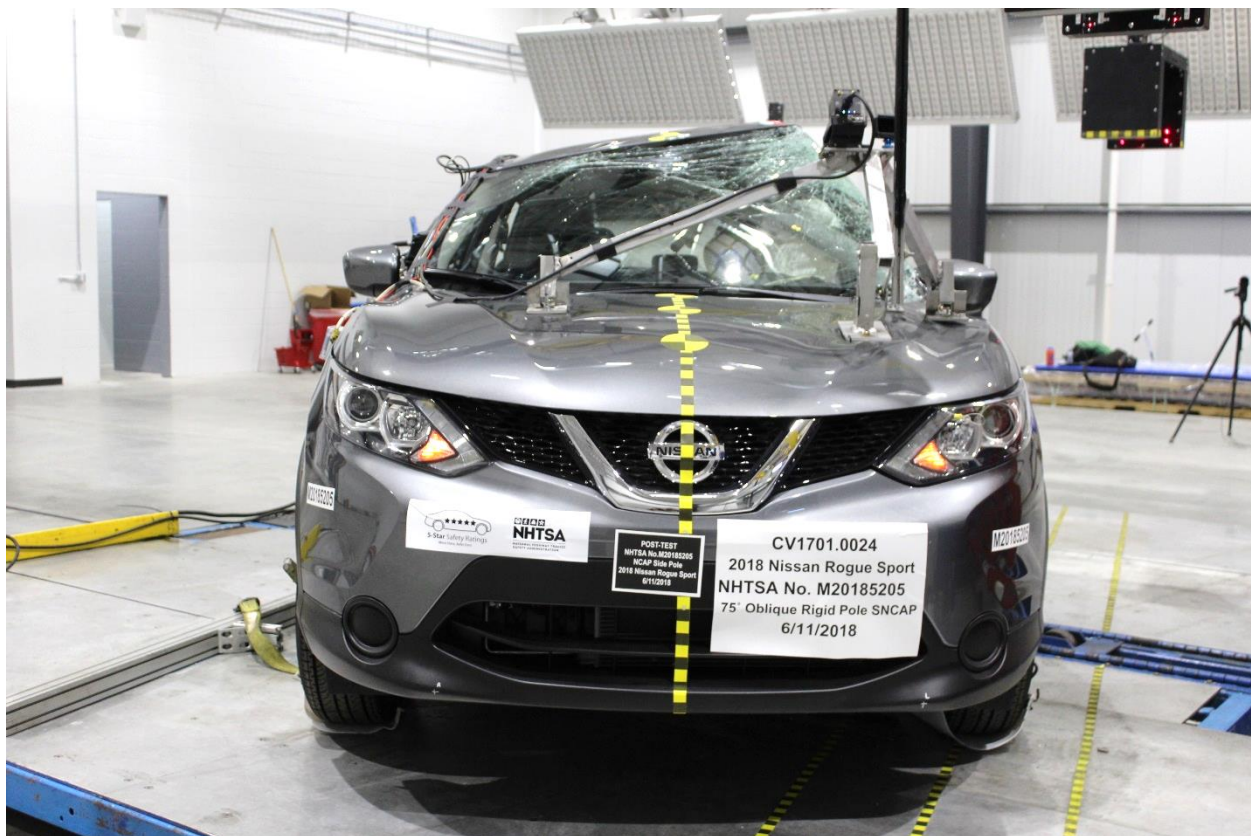
**Figure A-1: As Delivered Right Front  $\frac{3}{4}$  View of Test Vehicle**



**Figure A-2: As Delivered Left Rear  $\frac{3}{4}$  View of Test Vehicle**



**Figure A-3: Pre-Test Frontal View of Test Vehicle**



**Figure A-4: Post-Test Frontal View of Test Vehicle**



**Figure A-5: Pre-Test Left Front ¾ View of Test Vehicle**



**Figure A-6: Post-Test Left Front ¾ View of Test Vehicle**



**Figure A-7: Pre-Test Left Side View of Test Vehicle**



**Figure A-8: Post-Test Left Side View of Test Vehicle**



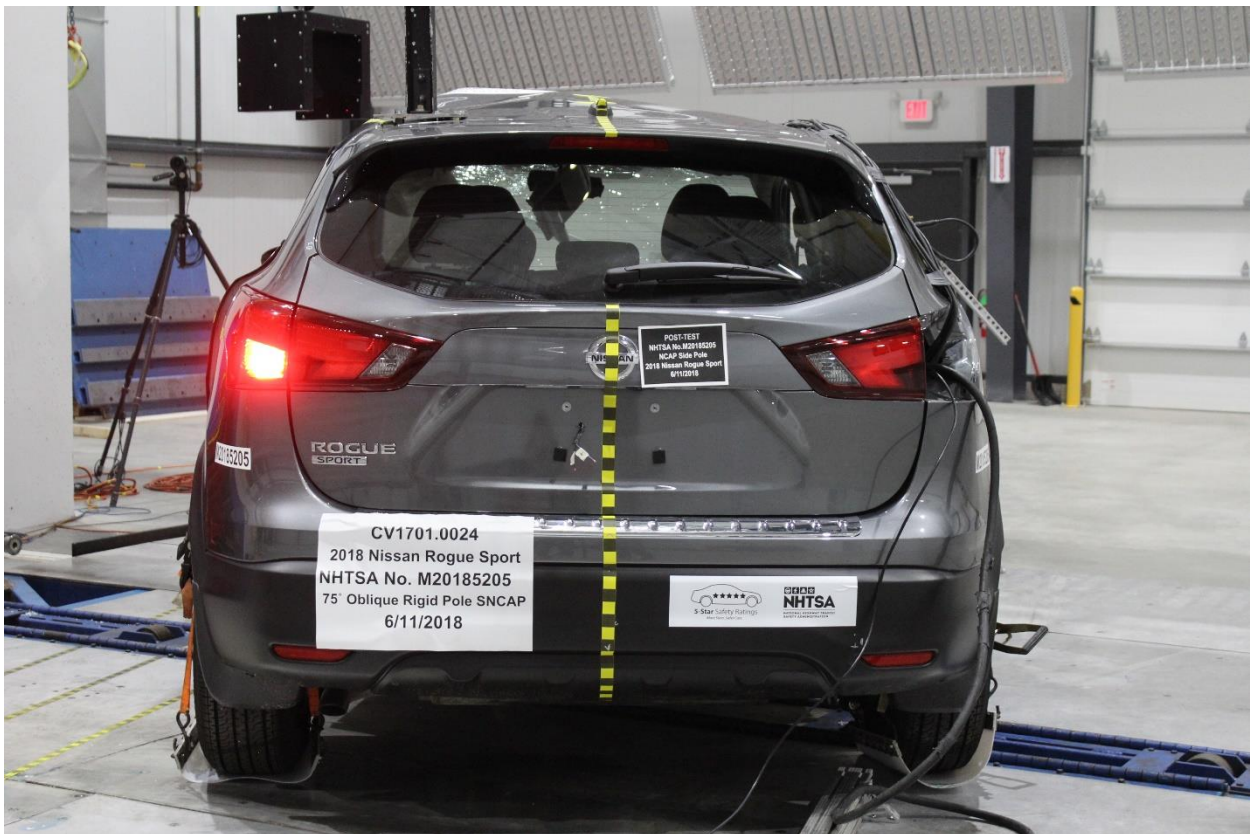
Figure A-9: Pre-Test Left Rear ¾ View of Test Vehicle



Figure A-10: Post-Test Left Rear ¾ View of Test Vehicle



**Figure A-11: Pre-Test Rear View of Test Vehicle**



**Figure A-12: Post-Test Rear View of Test Vehicle**

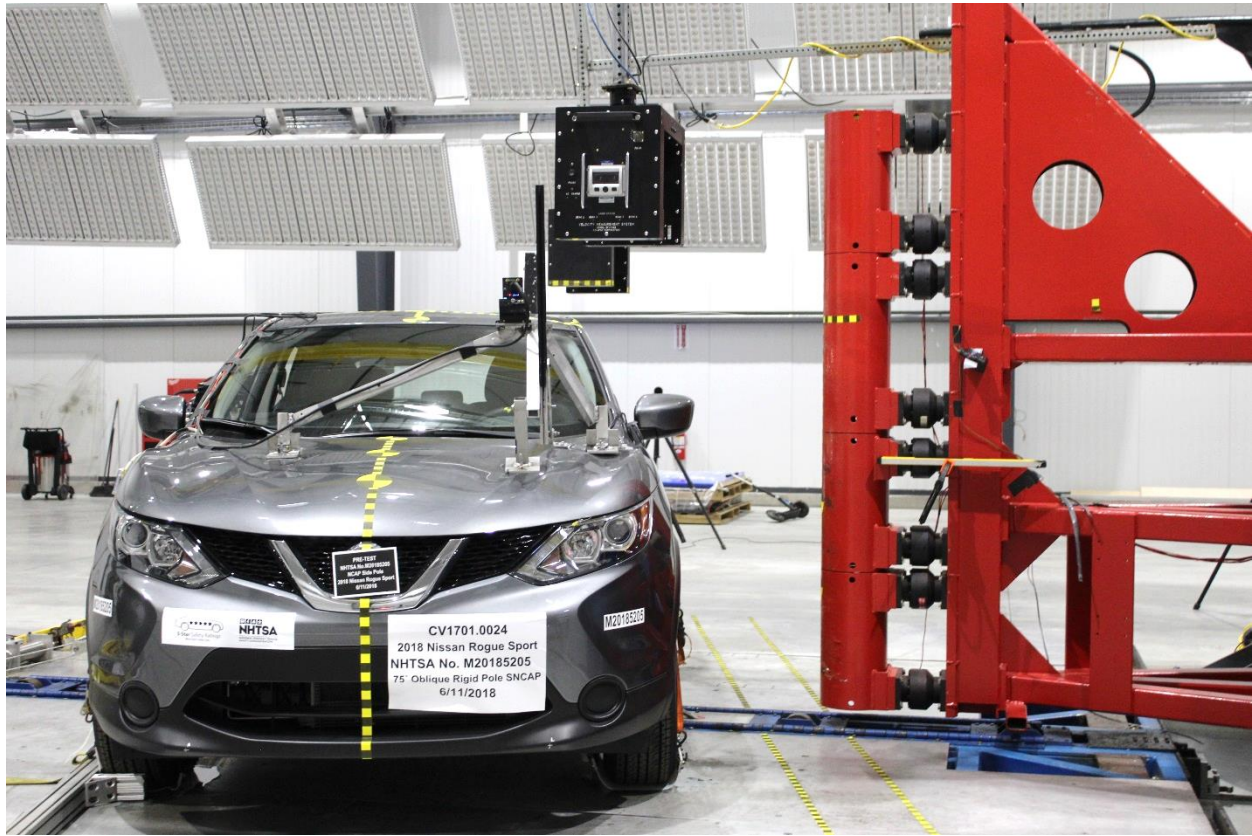


**Figure A-13: Pre-Test Right Side View of Test Vehicle**



**Figure A-14: Post-Test Right Side View of Test Vehicle**

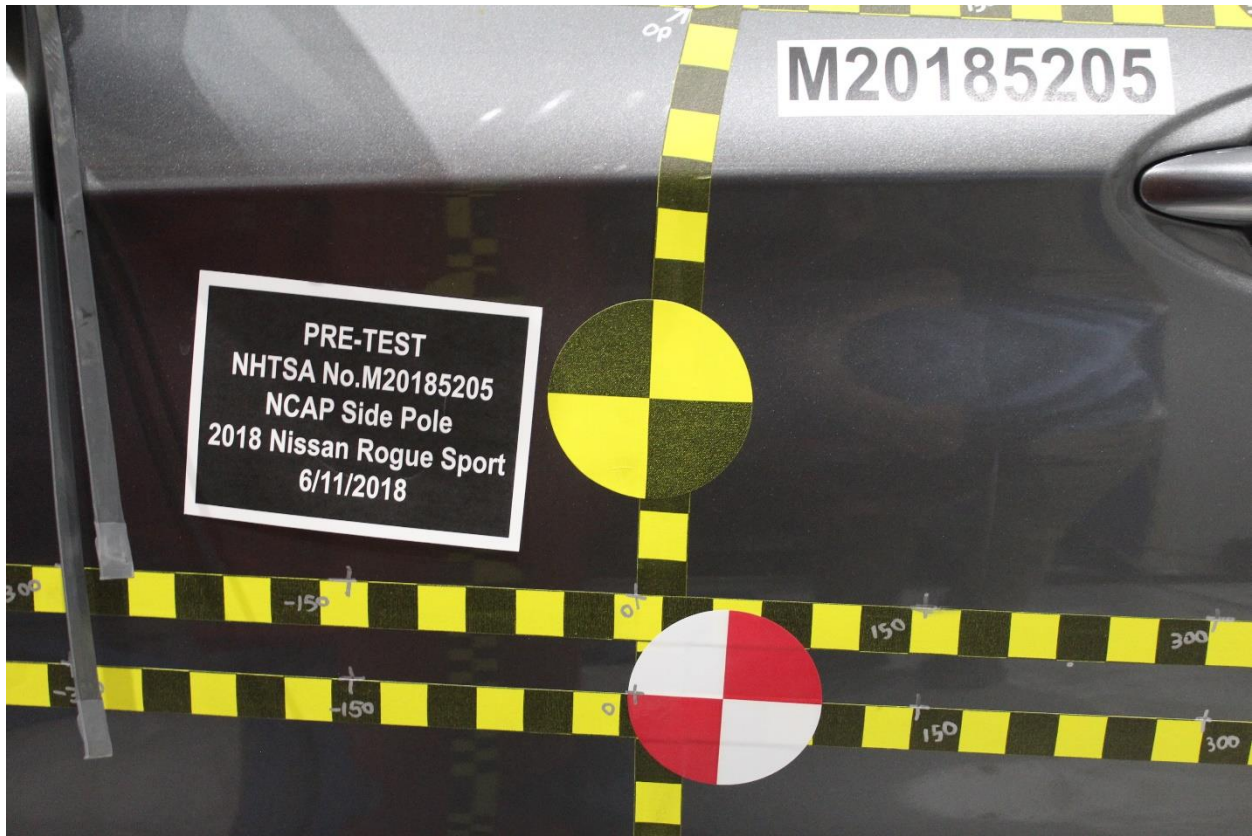




**Figure A-17: Pre-Test Left Side View of Pole Positioned Against Side of Vehicle**



**Figure A-18: Pre-Test Right Side View of Pole Positioned Against Side of Vehicle**



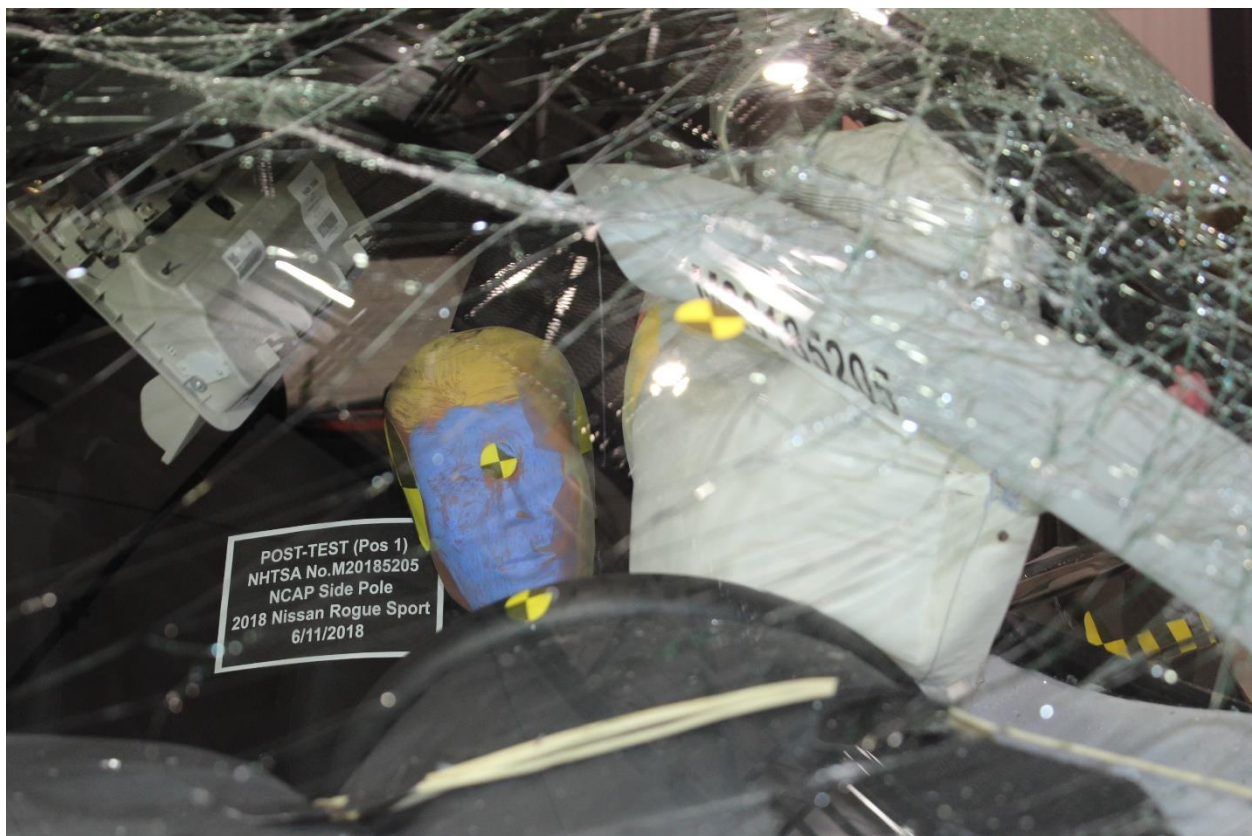
**Figure A-19: Pre-Test Close-Up View of Impact Point Target**



**Figure A-20: Post-Test Close-Up View of Impact Point Target Showing Impact Location**



**Figure A-21: Pre-Test Front Close-Up View of Dummy Head and Chest**



**Figure A-22: Post-Test Front Close-Up View of Dummy**



**Figure A-23: Pre-Test Left Side View of Dummy Showing Belt and Chalking**



701.0024  
 n Rogue Sport  
 M20185205  
 rigid Pole SNCAP  
 1/2018

PRE-TEST (Pos 1)  
 NHTSA No. M20185205  
 NCAP Side Pole  
 2018 Nissan Rogue Sport  
 6/11/2018

M20185205

**Figure A-24: Pre-Test Left Side View of Dummy Shoulder and Door Top View**



**Figure A-25: Post-Test Left Side View of Dummy Shoulder and Door Top View**



**Figure A-26: Pre-Test Frontal View of Seat Back Prior to Dummy Positioning**



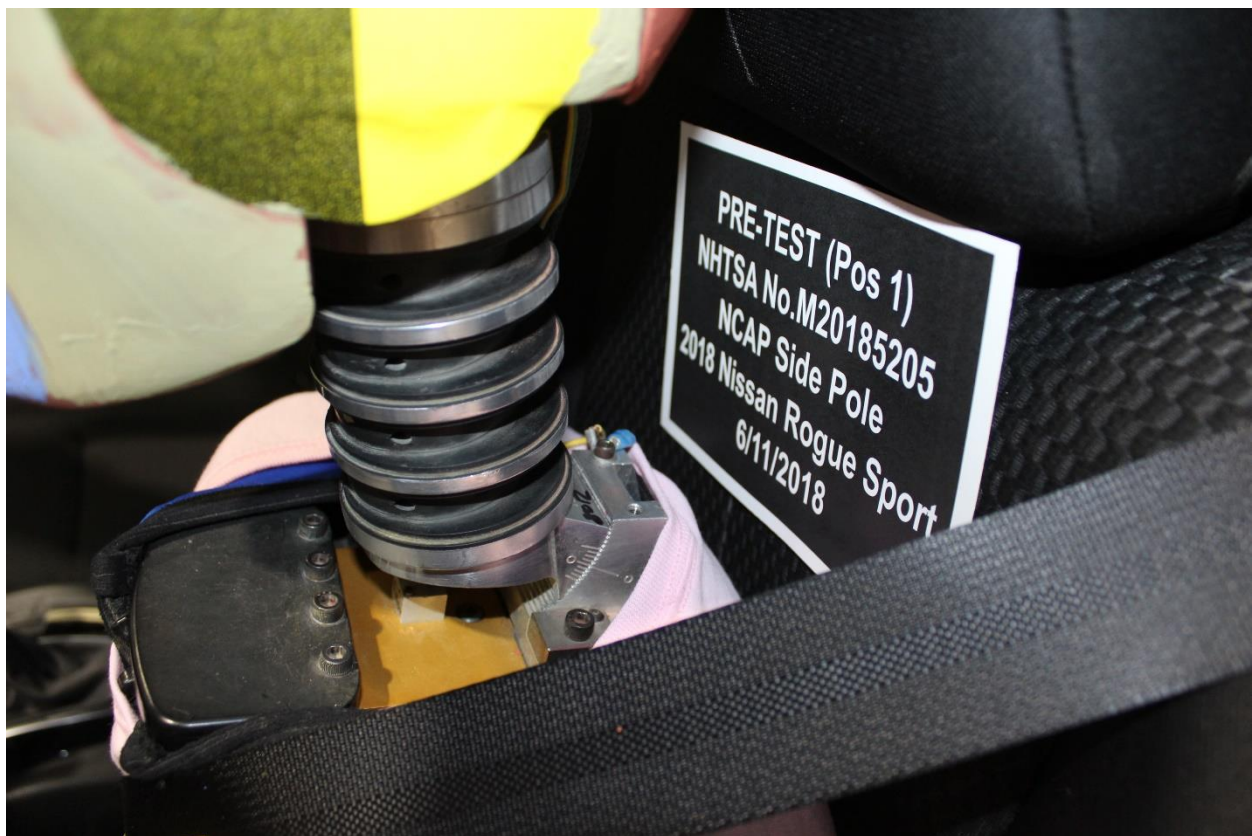
**Figure A-27: Pre-Test Frontal Close-Up View of Dummy Head / Shoulders in Relation to Head Restraint**



**Figure A-28: Pre-Test Frontal View of Seat Pan Prior to Dummy Positioning**



**Figure A-29: Pre-Test Overhead View of Dummy Thighs on Seat Pan**



**Figure A-30: Pre-Test Left Side View of Dummy's Neck Showing Position of Adjustable Neck Bracket**



Figure A-31: Pre-Test Left Side View of Dummy's Head Showing Dummy's Head is Level

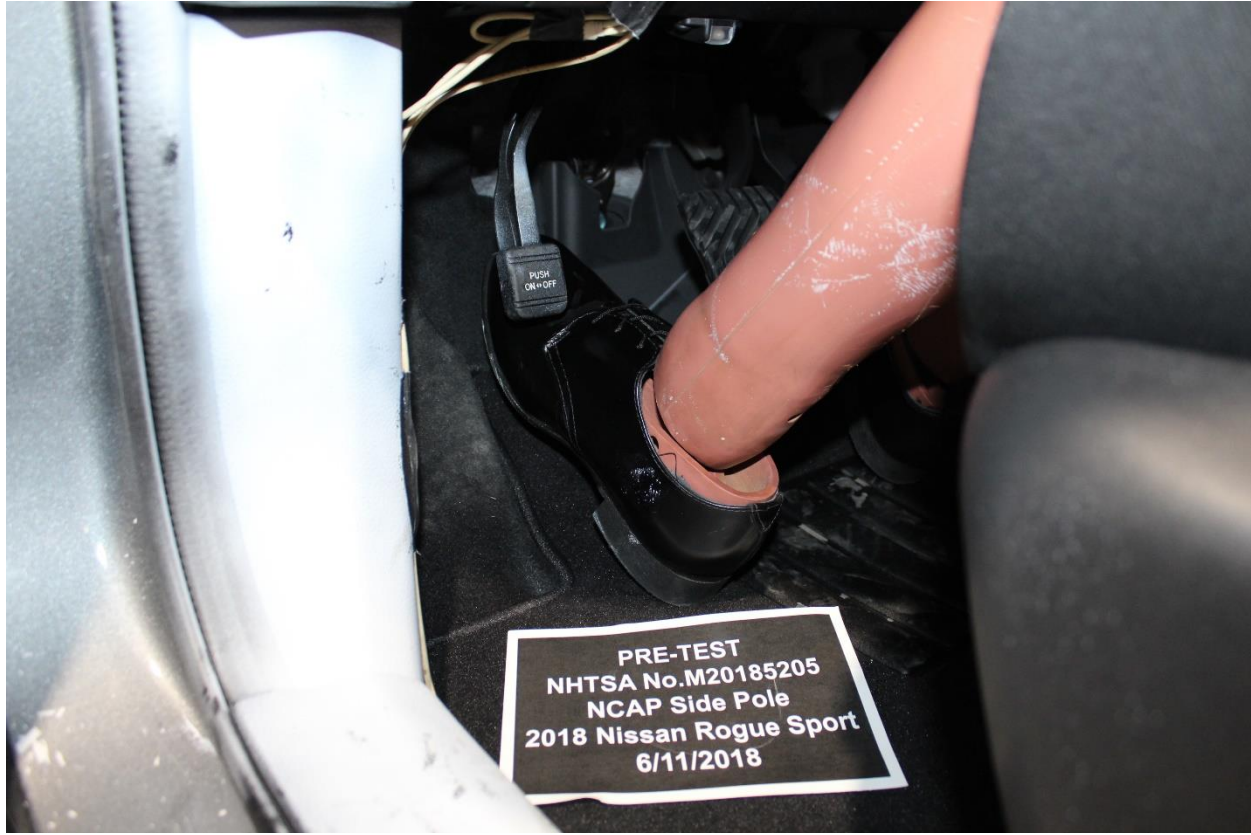


Figure A-32: Pre-Test Placement of Dummy's Feet



**Figure A-33: Pre-Test View of Belt Anchorage for Dummy**



**Figure A-34: Pre-Test Left Side View of Steering Wheel**



**Figure A-35: Pre-Test View of Disengaged Parking Brake**



**Figure A-36: Pre-Test View of Parking Brake**

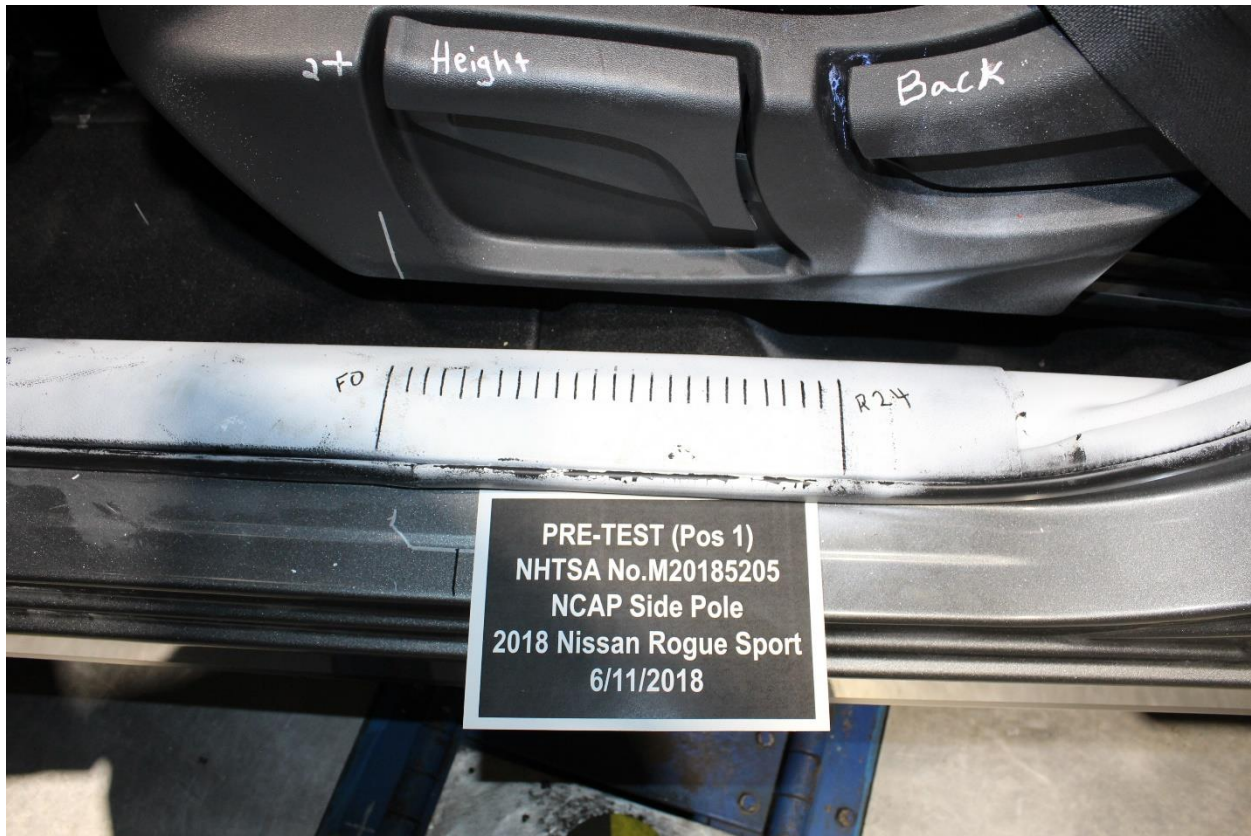


Figure A-37: Pre-Test Close-Up Left Side View of Driver Seat Track



Figure A-38: Pre-Test Close-Up Left Side View of Driver Seat Back



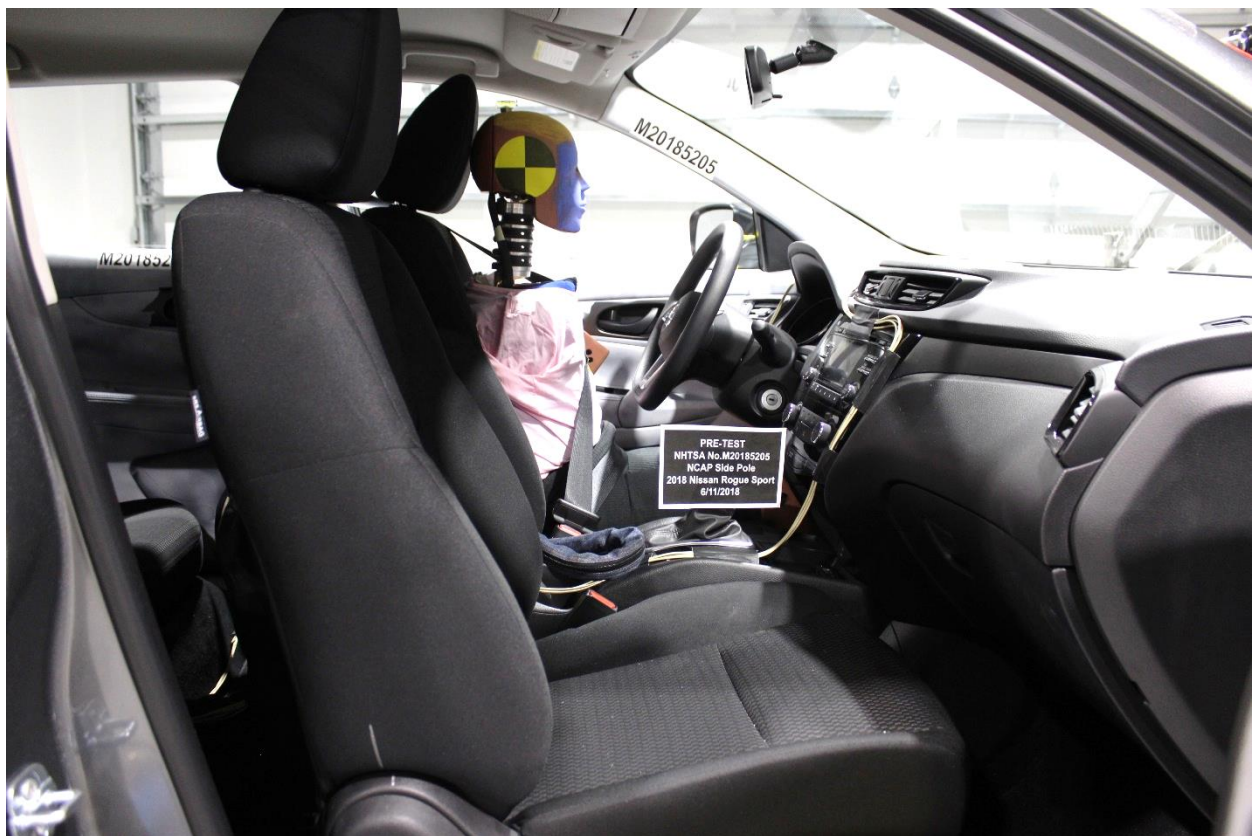
**Figure A-39: Pre-Test Close-Up View of Driver Seat Back or Head Restraint**



**Figure A-40: Pre-Test Dummy and Door Clearance View**



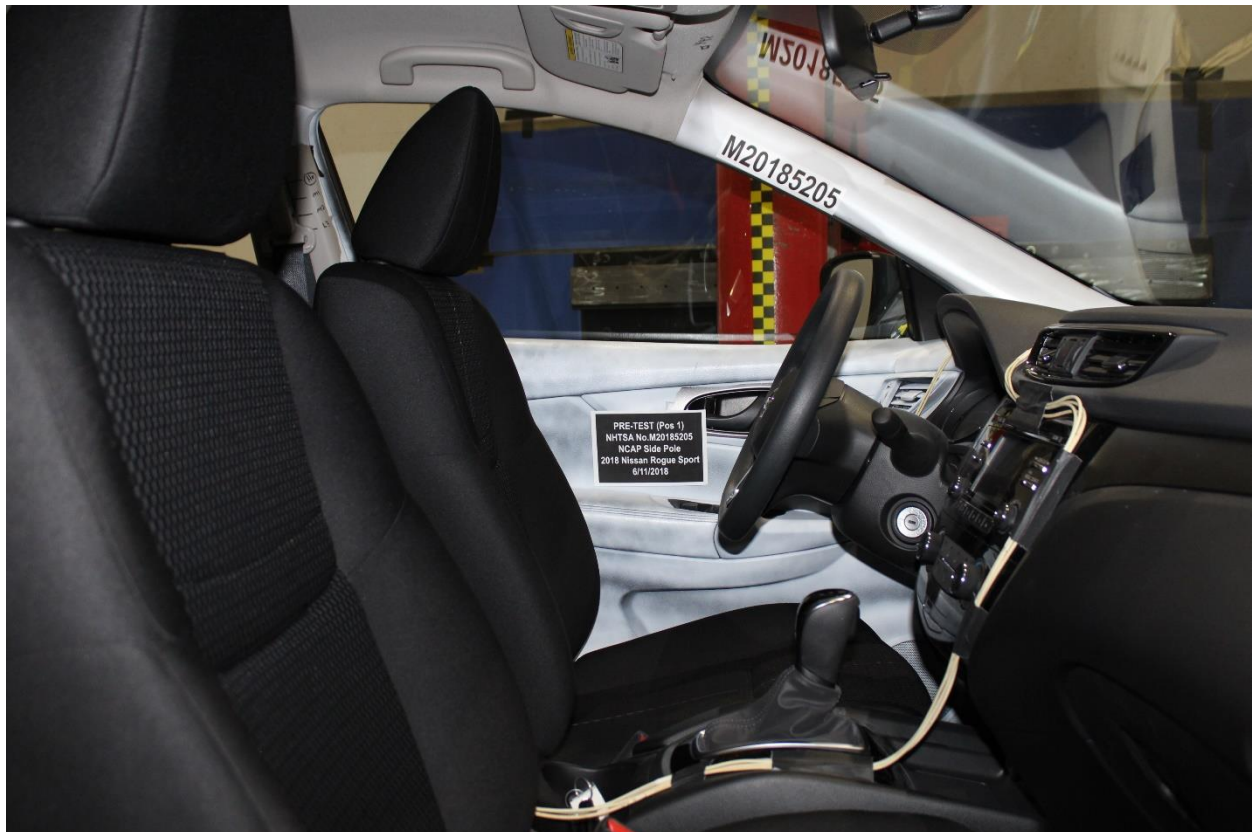
**Figure A-41: Post-Test Dummy and Door Clearance View**



**Figure A-42: Pre-Test Right Side View of Dummy and Front Seat of Occupant Compartment**



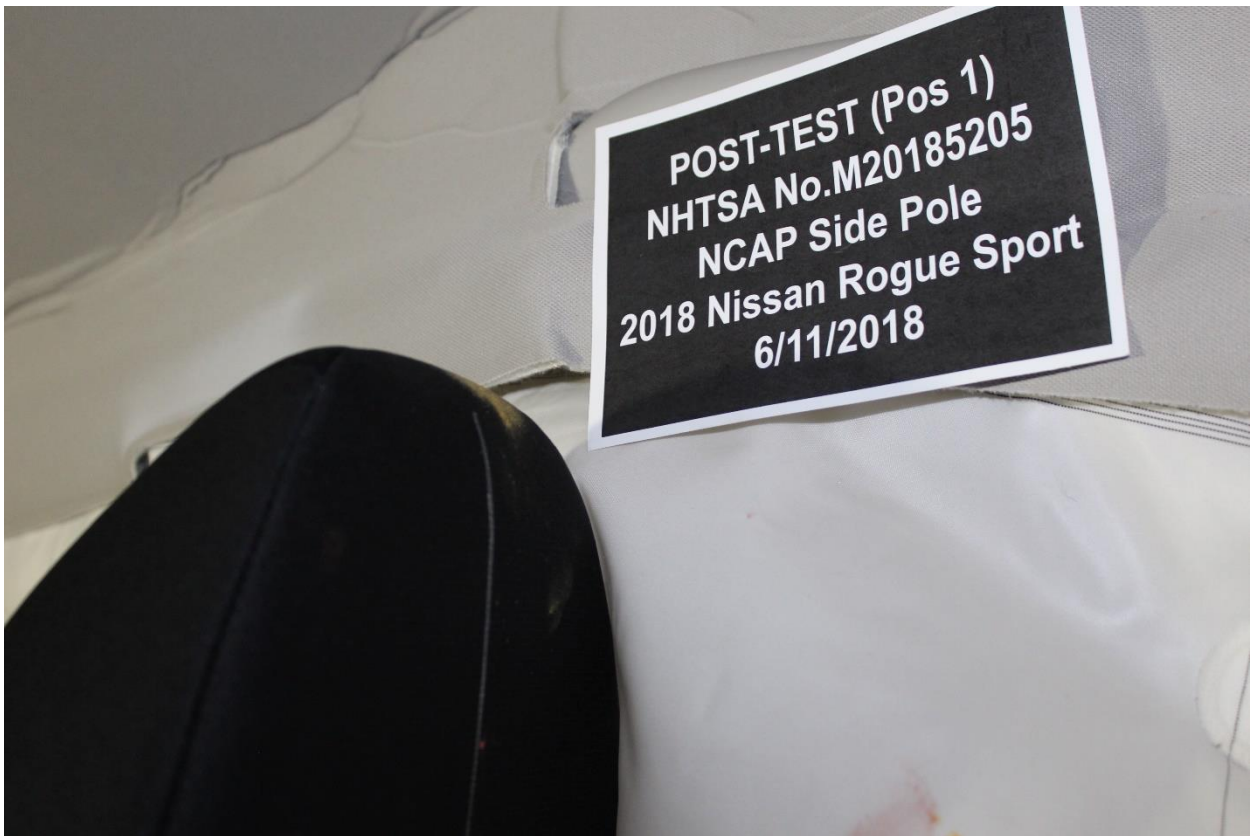
**Figure A-43: Post-Test Right Side View of Dummy and Front Seat of Occupant Compartment**



**Figure A-44: Pre-Test Inner Door Panel View**



**Figure A-45: Post-Test Inner Door Panel View Showing Dummy Contact Location**



**Figure A-46: Post-Test Dummy Close-Up Head Contact with Vehicle Interior View**



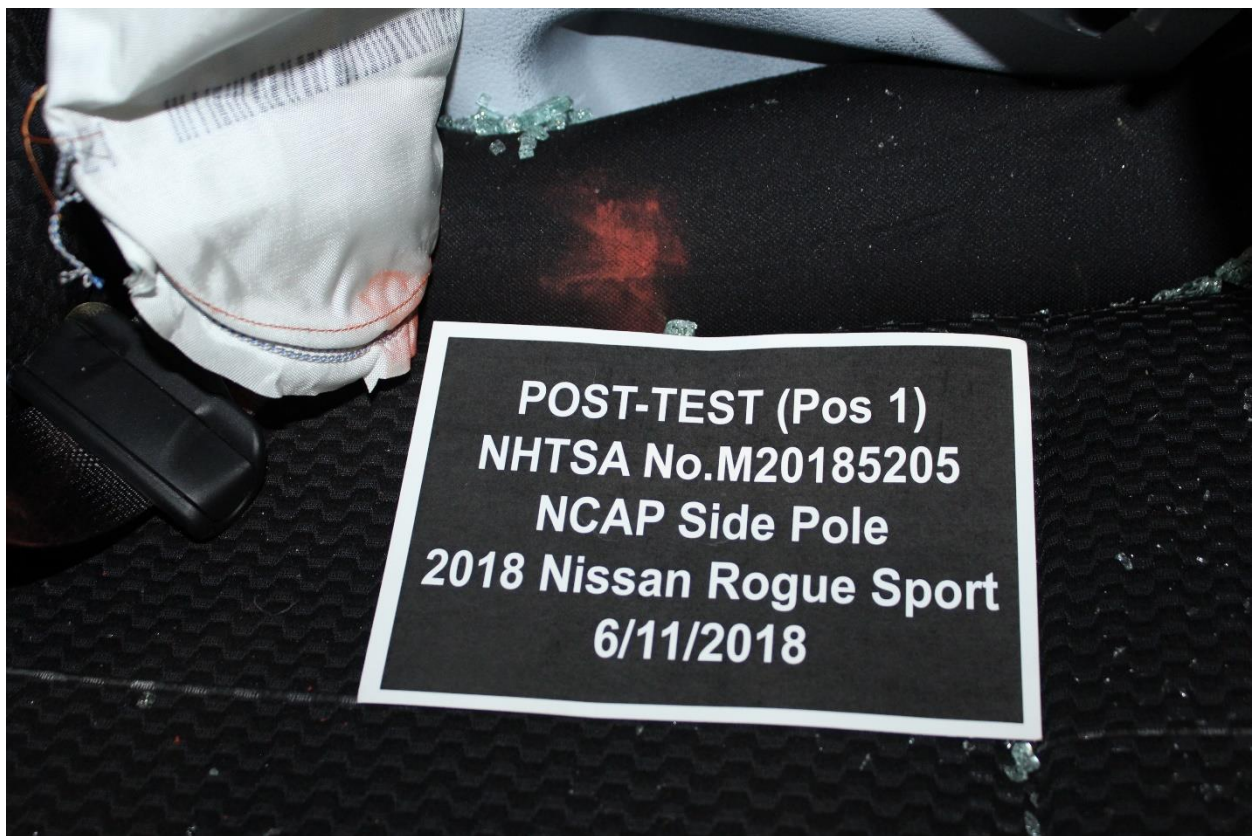
**Figure A-47: Post-Test Dummy Close-Up Head Contact with Side Airbag View**



**Figure A-48: Post-Test Dummy Close-Up Torso Contact with Vehicle Interior View**



**Figure A-49: Post-Test Dummy Close-Up Torso Contact with Side Airbag View**



**Figure A-50: Post-Test Dummy Close-Up Pelvis Contact with Vehicle Interior View**



**Figure A-51: Post-Test Dummy Close-Up Pelvis Contact with Side Airbag View**

**Photo Not Applicable**

**Figure A-52: Post-Test Dummy Close-Up Knee Contact with Vehicle Interior View**



**Figure A-53: Pre-Test View of Fuel Filler Cap or Fuel Filler Neck**



**Figure A-54: Post-Test View of Fuel Filler Cap or Fuel Filler Neck**



Figure A-55: Close-Up View of Vehicle's Certification Label

**Photo Not Applicable**

Figure A-55a: Close-Up View of Reduced Load Capacity Label



Figure A-56: Close-Up View of Vehicle's Tire Information Placard or Label

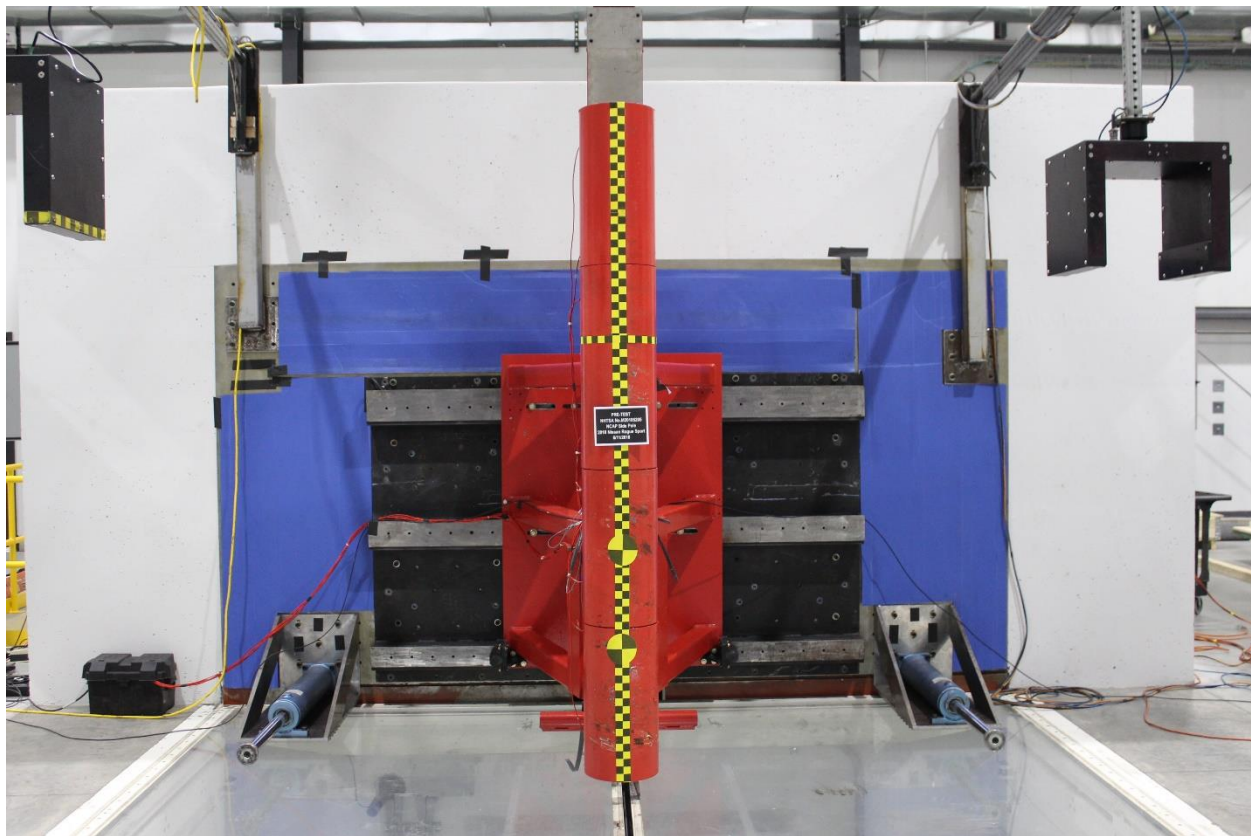
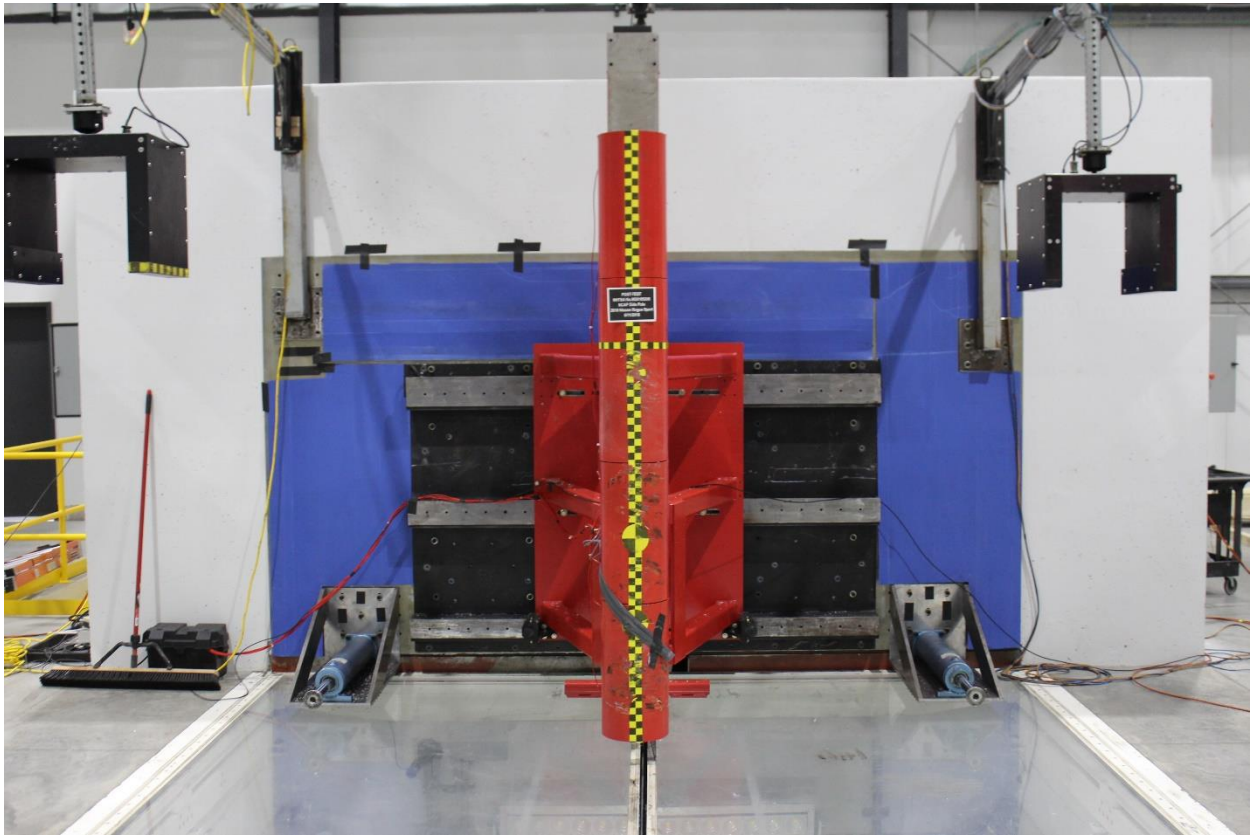
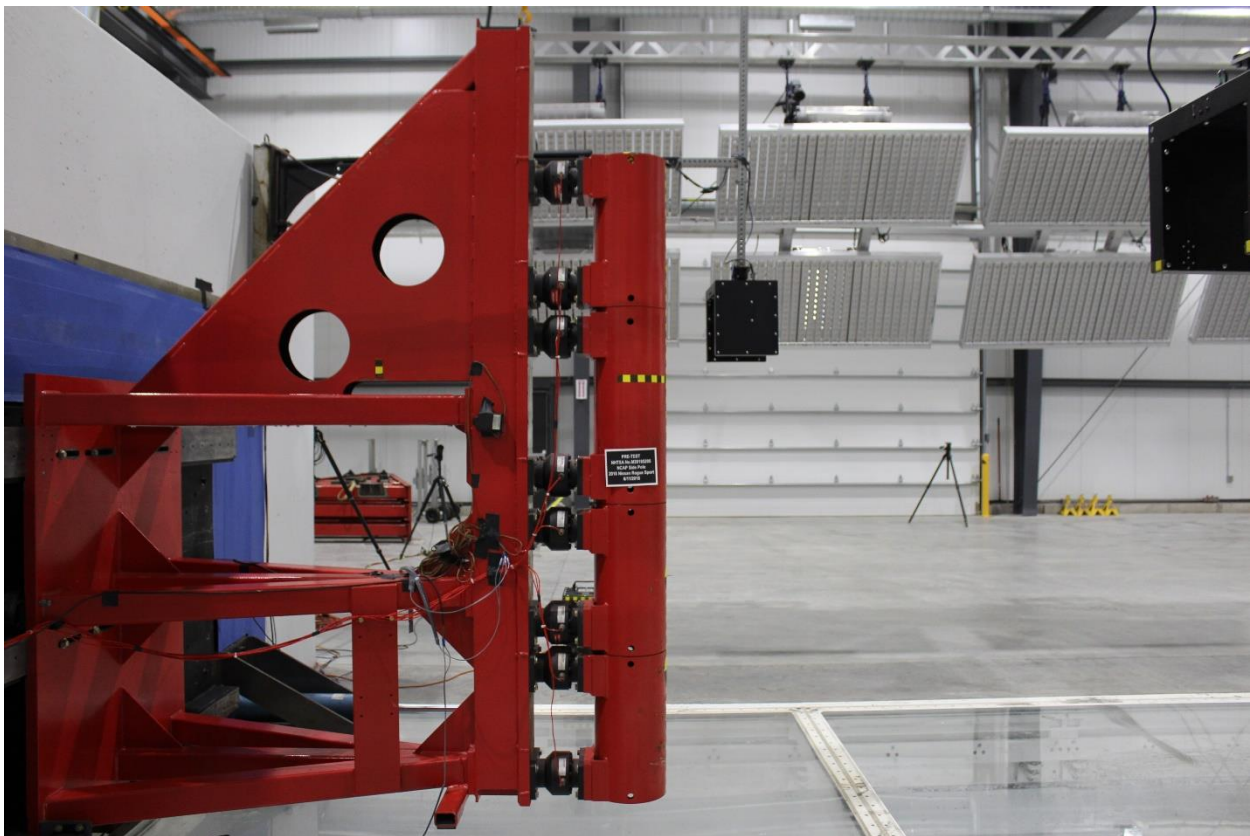


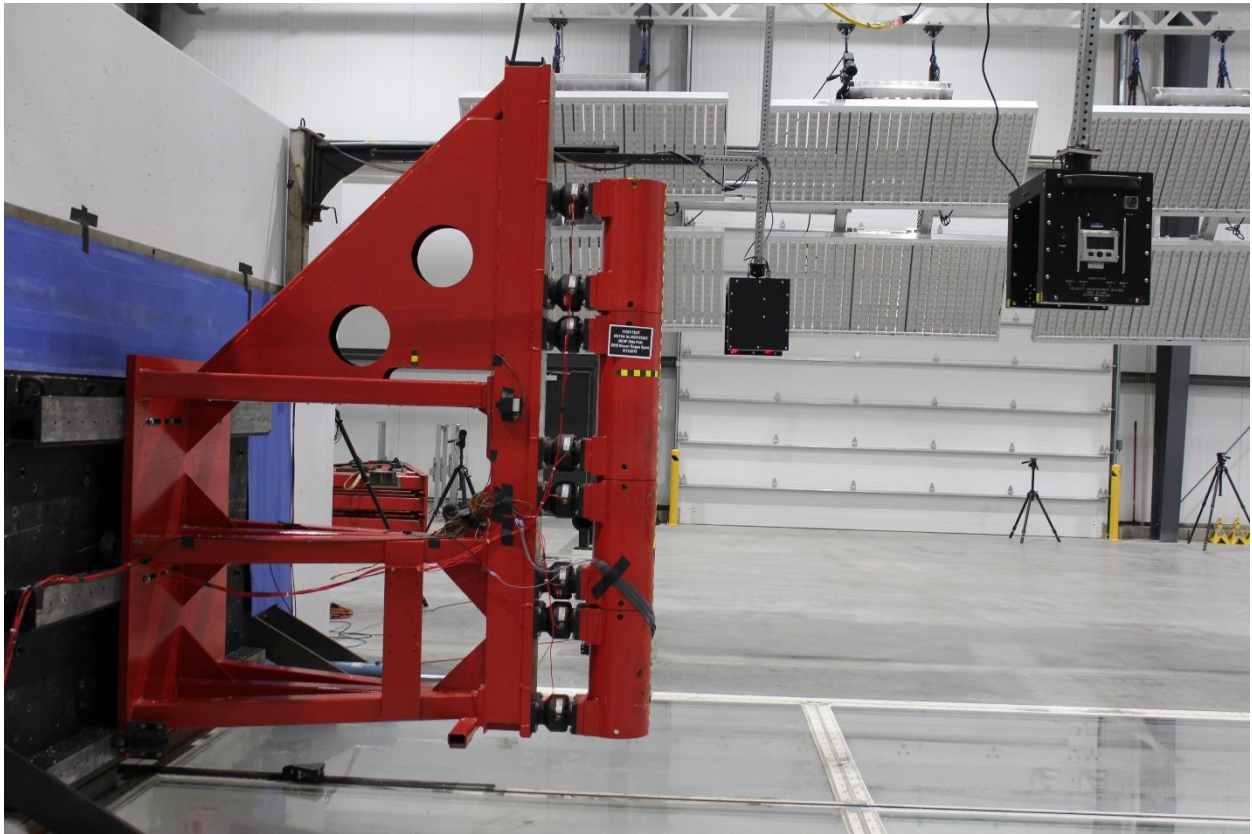
Figure A-57: Pre-Test Pole Barrier Front View



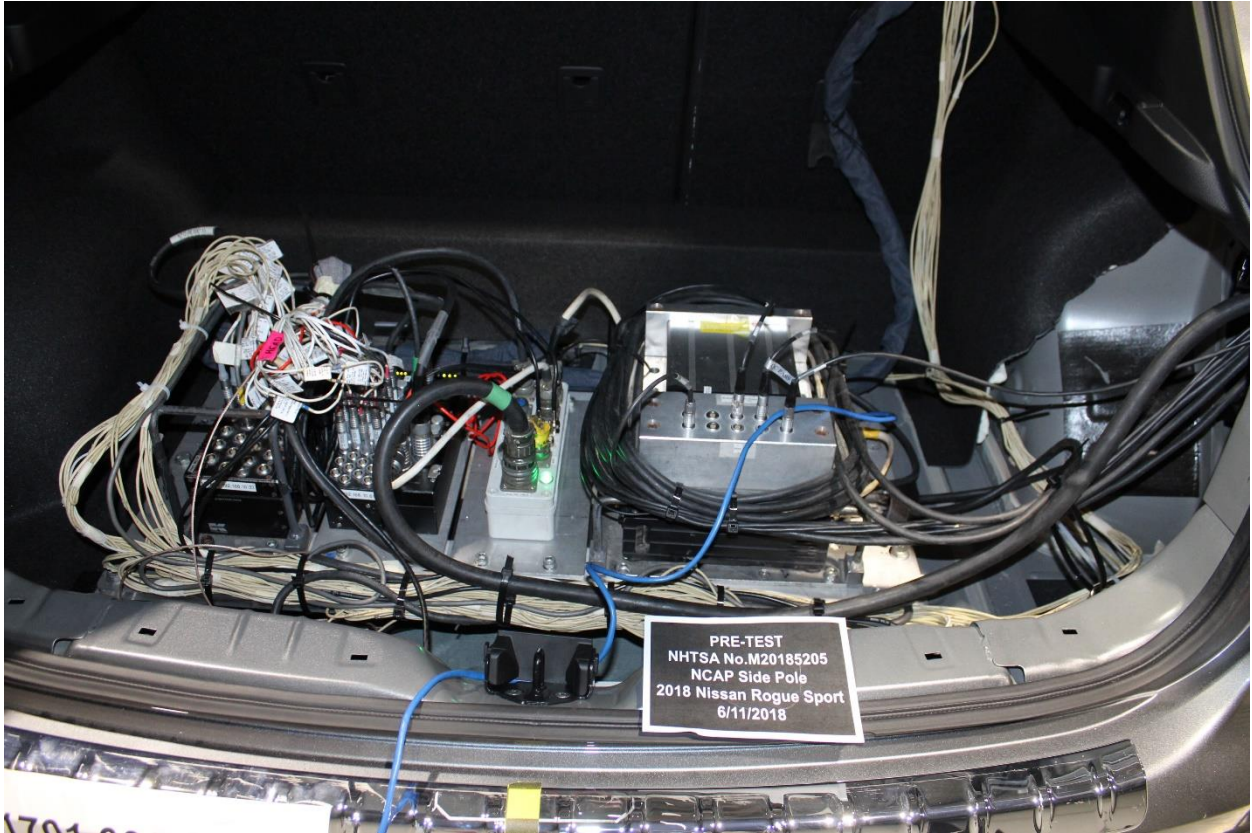
**Figure A-58: Post-Test Pole Barrier Front View**



**Figure A-59: Pre-Test Pole Barrier Side View**



**Figure A-60: Post-Test Pole Barrier Side View**



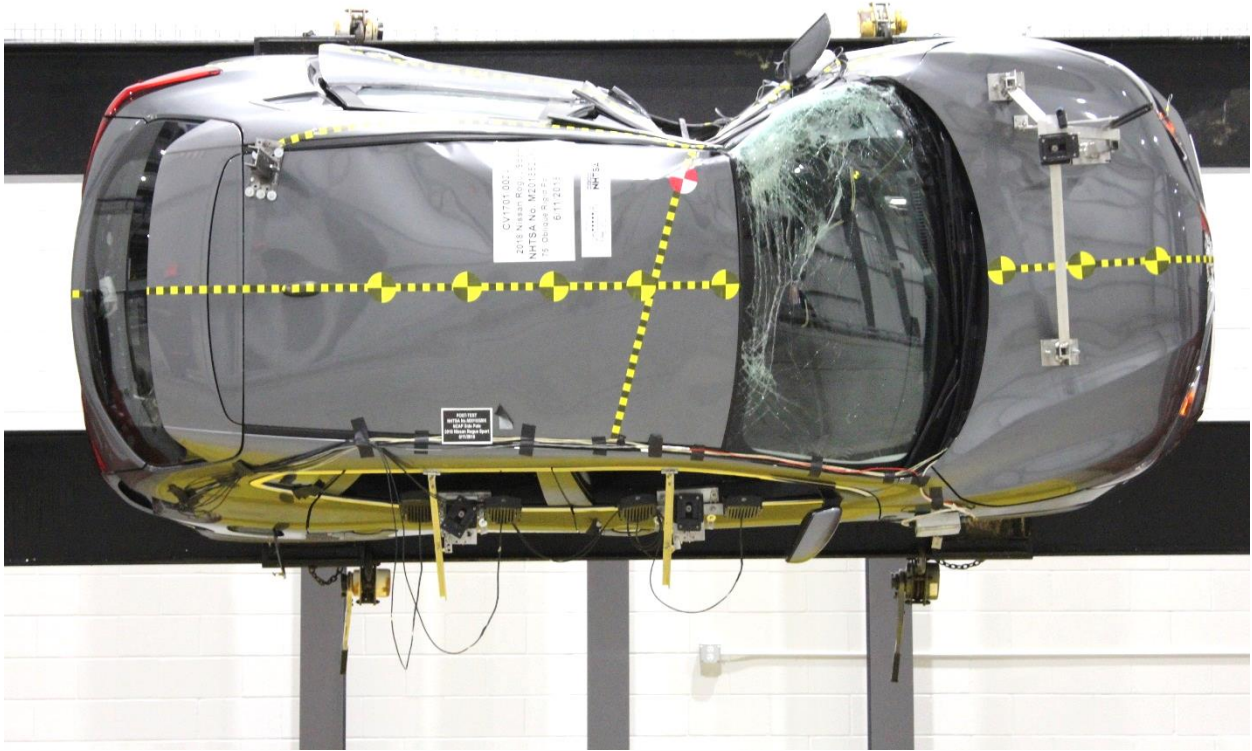
**Figure A-61: Pre-Test Ballast View**



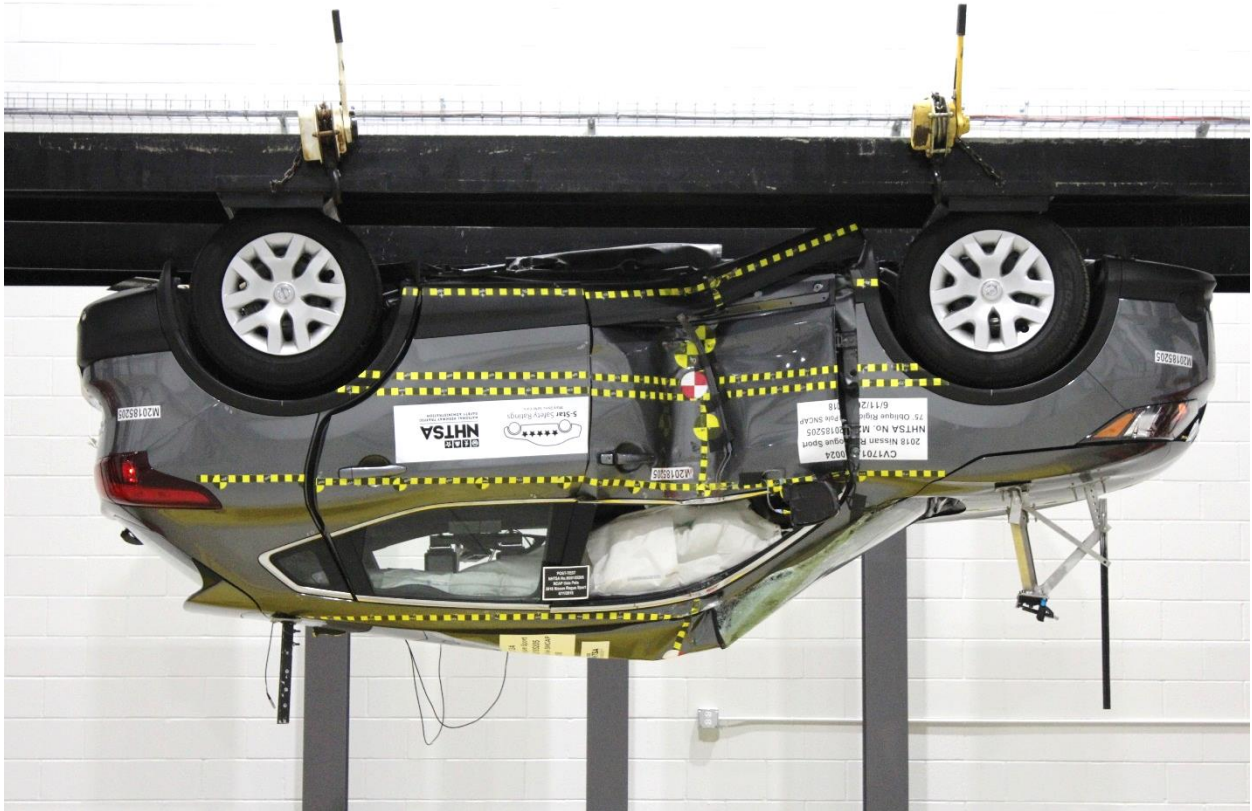
Figure A-62: Post-Test Primary and Redundant Speed Trap Read-Out



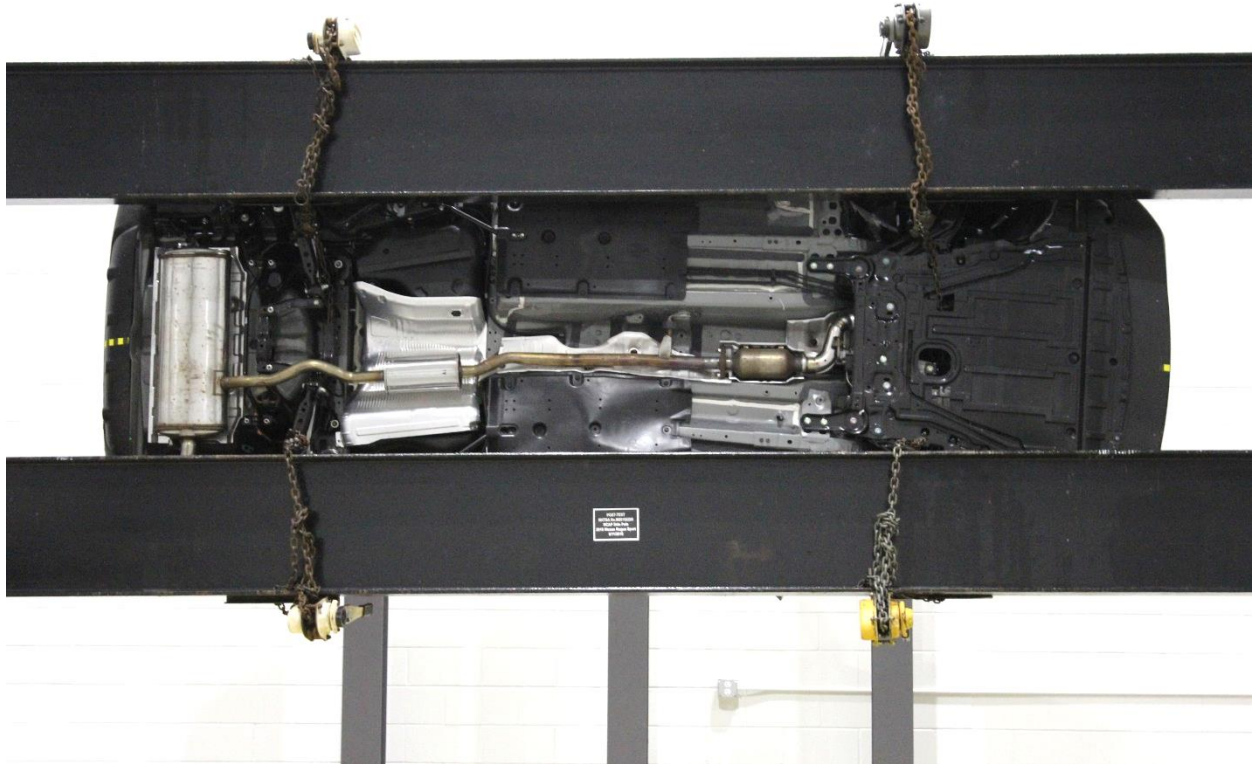
Figure A-63: FMVSS No. 301 Static Rollover 0 Degrees



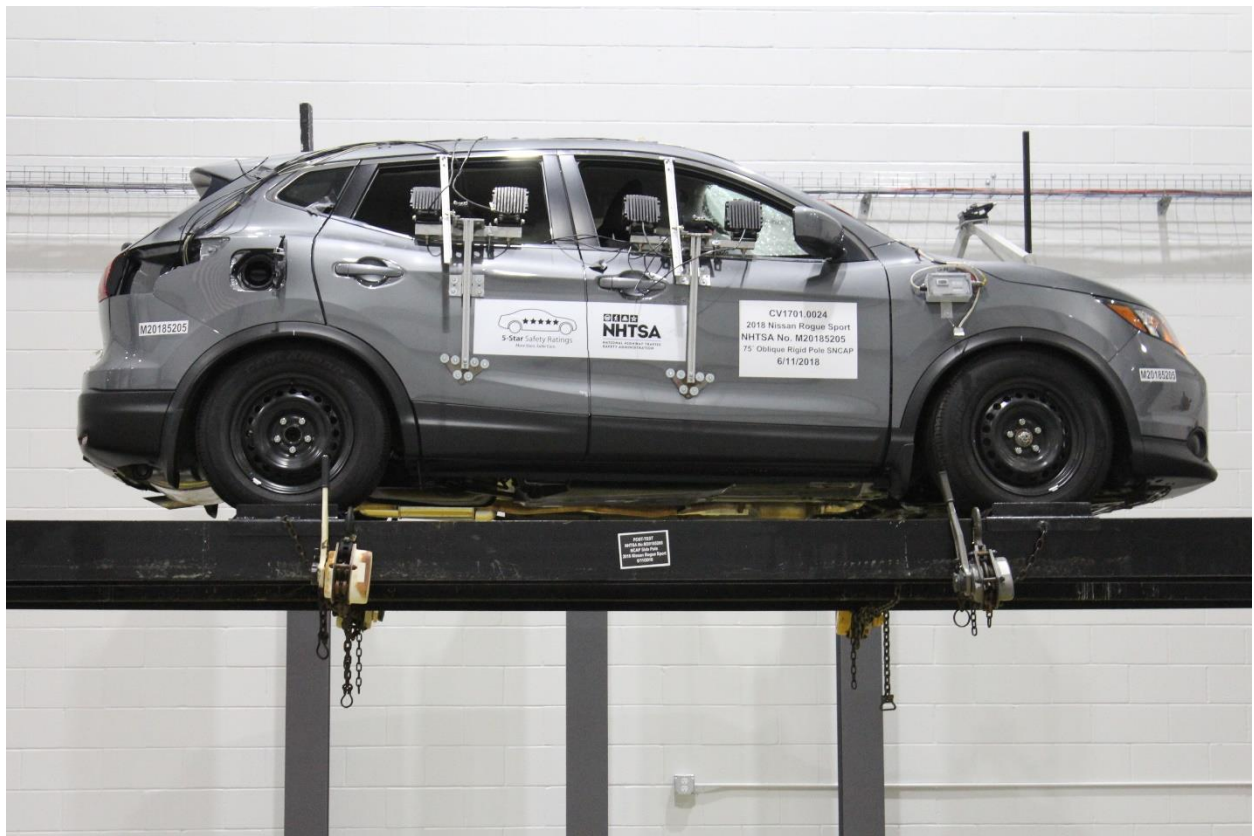
**Figure A-64: FMVSS No. 301 Static Rollover 90 Degrees**



**Figure A-65: FMVSS No. 301 Static Rollover 180 Degrees**

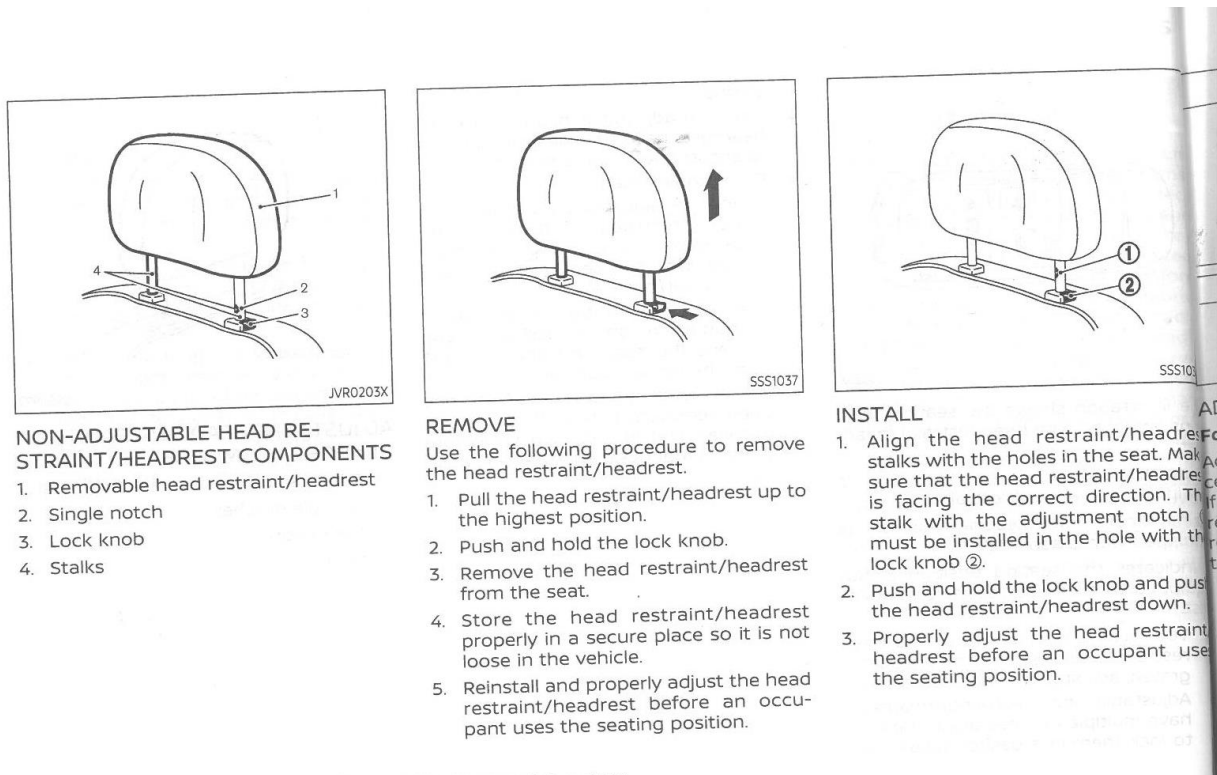


**Figure A-66: FMVSS No. 301 Static Rollover 270 Degrees**

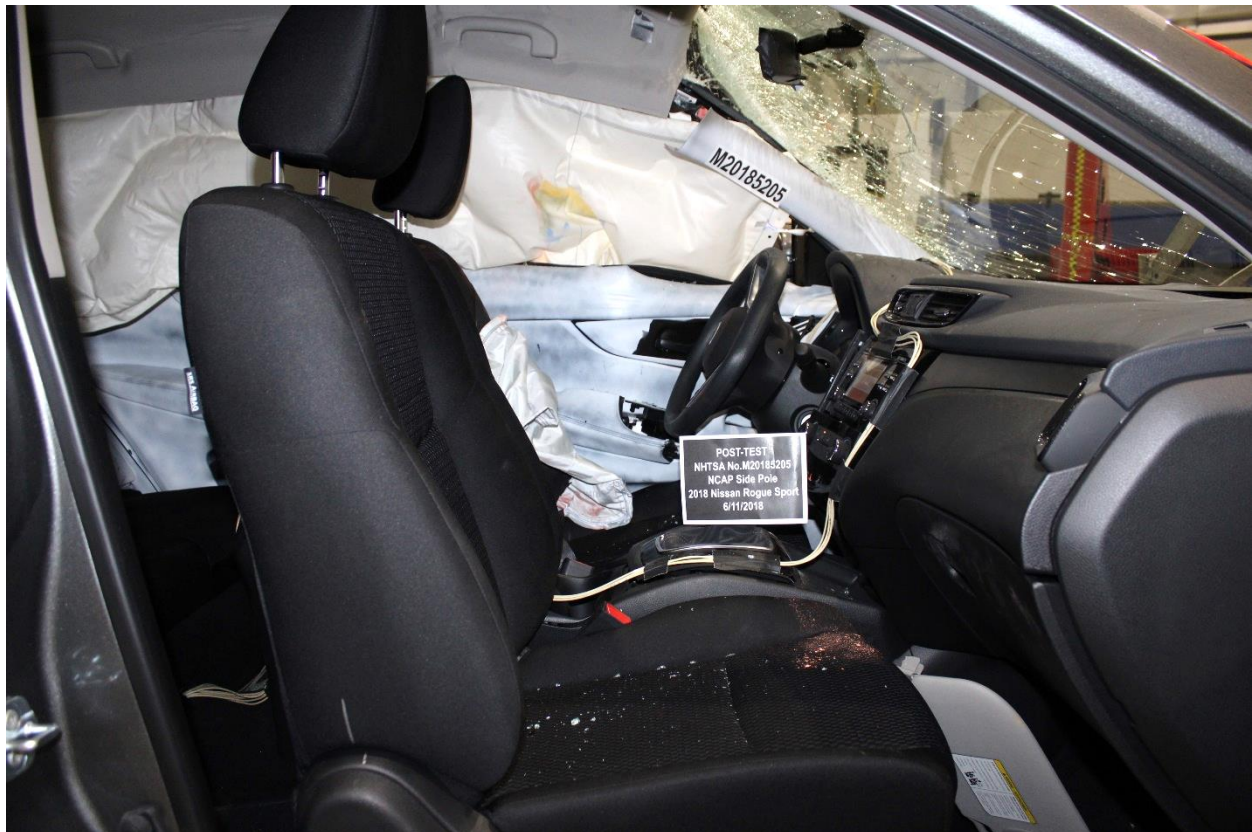


**Figure A-67: FMVSS No. 301 Static Rollover 360 Degrees**





**Figure A-70: Head Restraint Use and Adjustment Information from Vehicle Owner's Manual**



**Figure A-71: Post-Test View of Shattered Vehicle Inner Door Panel (if applicable)**

## APPENDIX B

### VEHICLE AND DUMMY RESPONSE DATA PLOTS

**TABLE OF DATA PLOTS**  
**Driver Dummy Instrumentation Plots**

<b>Fig.</b>	<b>Description</b>	<b>Page</b>
1	Driver Head Acceleration (X) Primary vs. Time	B-4
2	Driver Head Acceleration (Y) Primary vs. Time	B-4
3	Driver Head Acceleration (Z) Primary vs. Time	B-4
4	Driver Head Resultant Acceleration Primary vs. Time	B-4
5	Driver Lower Spine T12 Acceleration (X) vs. Time	B-5
6	Driver Lower Spine T12 Acceleration (Y) vs. Time	B-5
7	Driver Lower Spine T12 Acceleration (Z) vs. Time	B-5
8	Driver Lower Spine T12 Resultant Acceleration vs. Time	B-5
9	Driver Iliac Wing Force on Impact Side (Y) vs. Time	B-6
10	Driver Acetabulum Force on Impact Side (Y) vs. Time	B-6
11	Driver Total Pelvis Force on Impact Side (Y) vs. Time	B-6

The following additional data for this test can be obtained from the Research and Development section of the NHTSA website. The website can be found at [www.NHTSA.dot.gov](http://www.NHTSA.dot.gov).

### **Additional Driver Dummy Instrumentation Data**

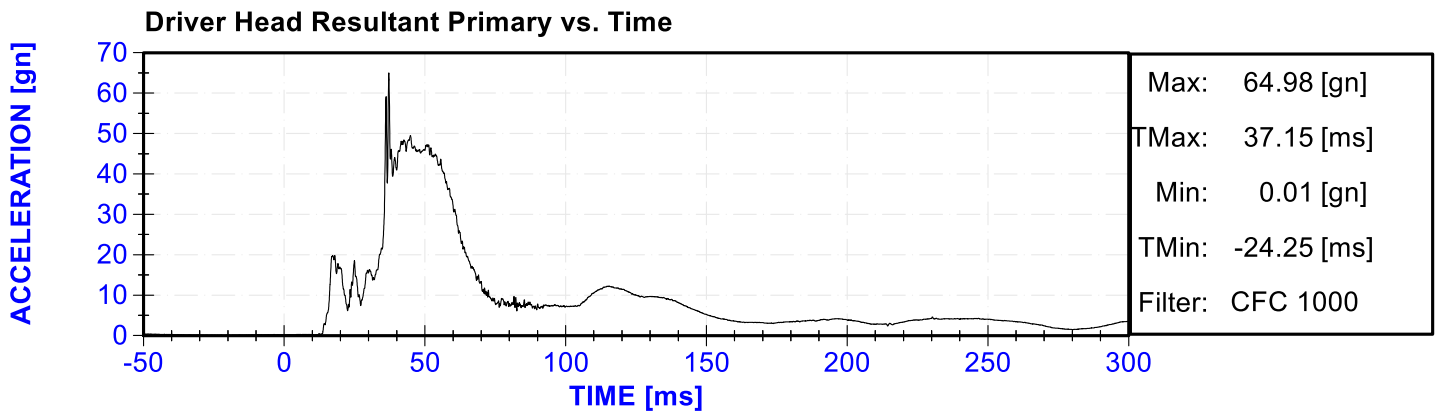
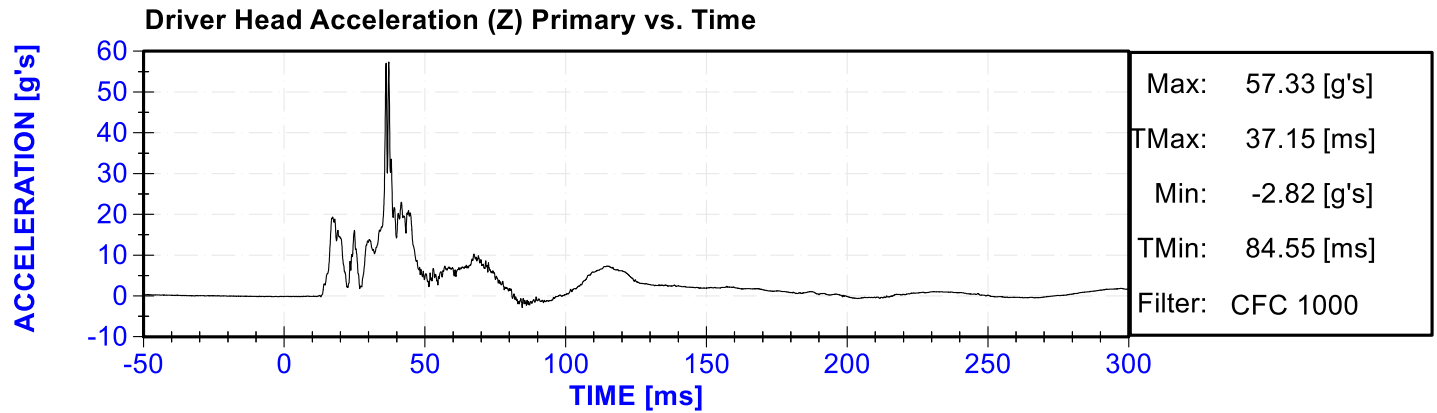
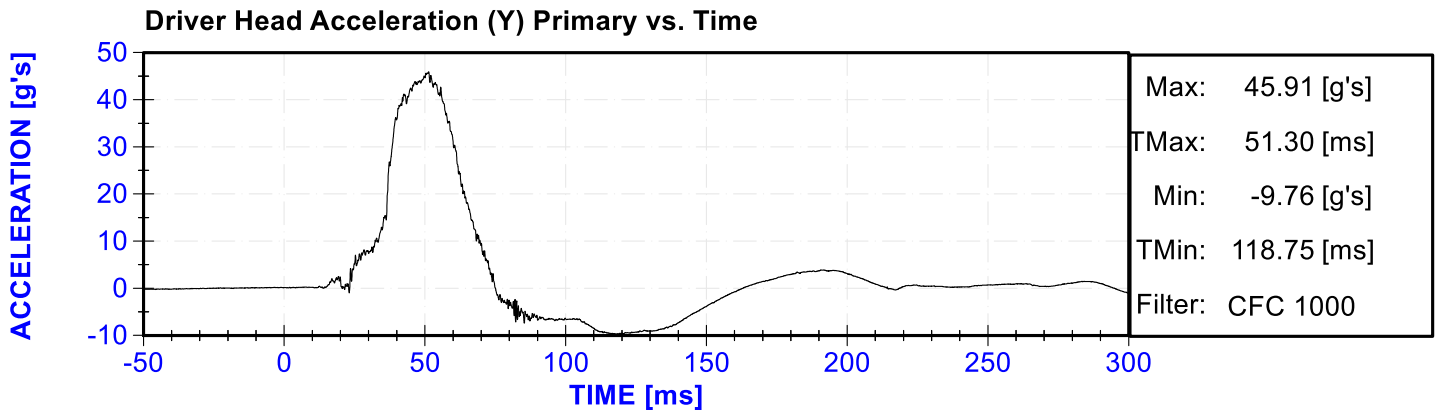
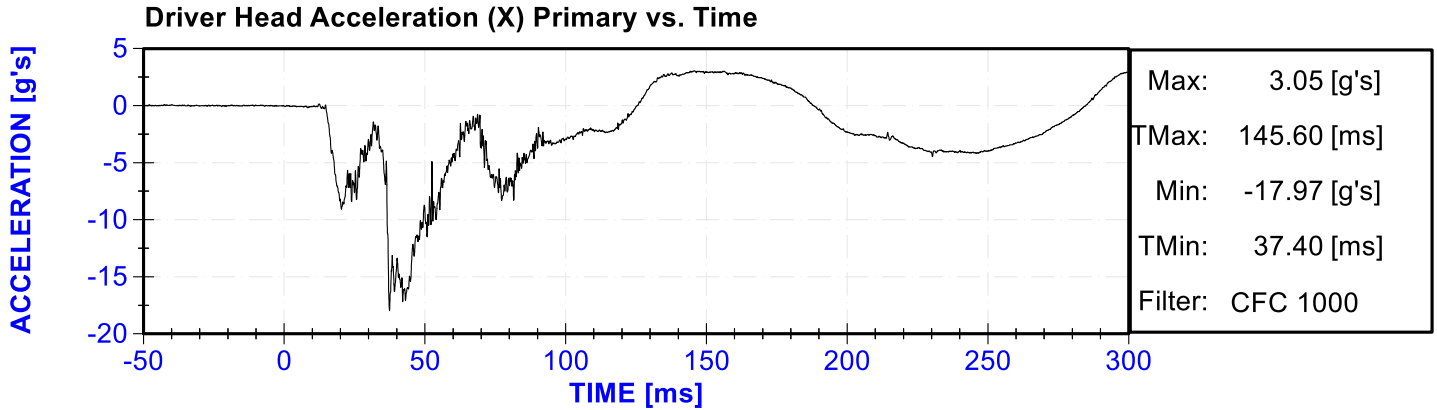
Driver Head Acceleration Redundant (X)  
Driver Head Acceleration Redundant (Y)  
Driver Head Acceleration Redundant (Z)  
Driver Upper Thorax Rib Deflection (Y)  
Driver Middle Thorax Rib Deflection (Y)  
Driver Lower Thorax Rib Deflection (Y)  
Driver Upper Abdomen Rib Deflection (Y)  
Driver Lower Abdomen Rib Deflection (Y)

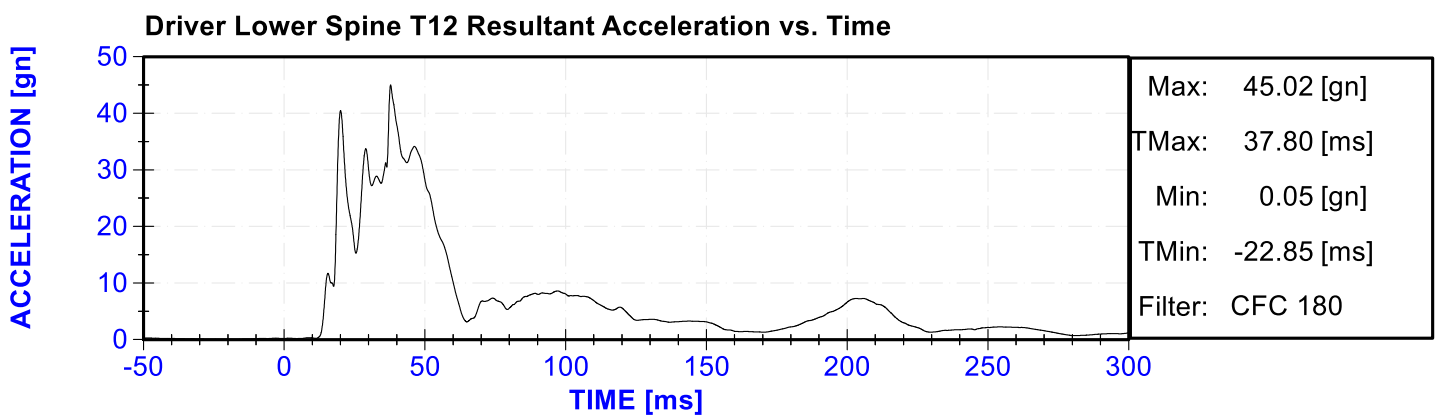
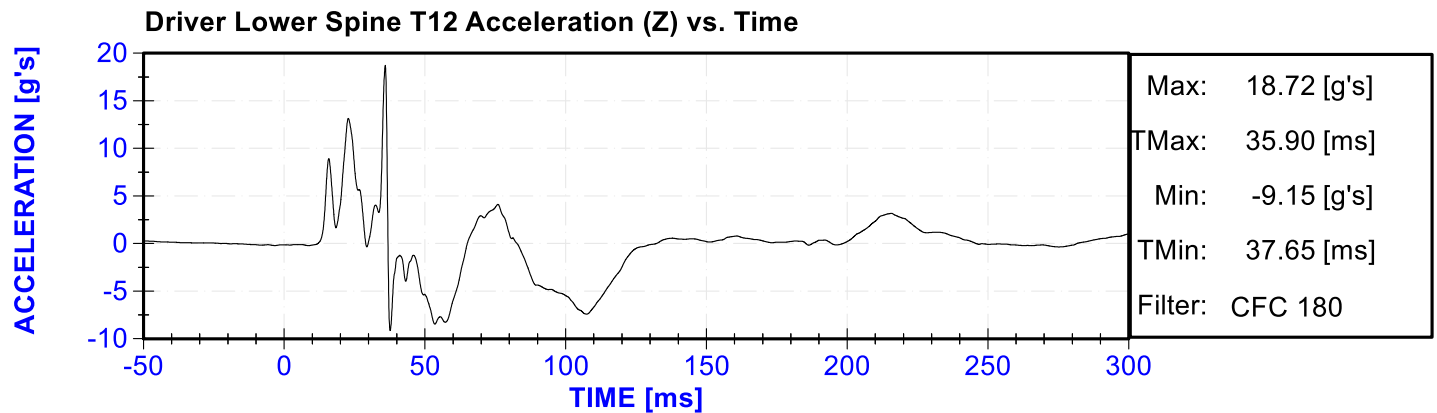
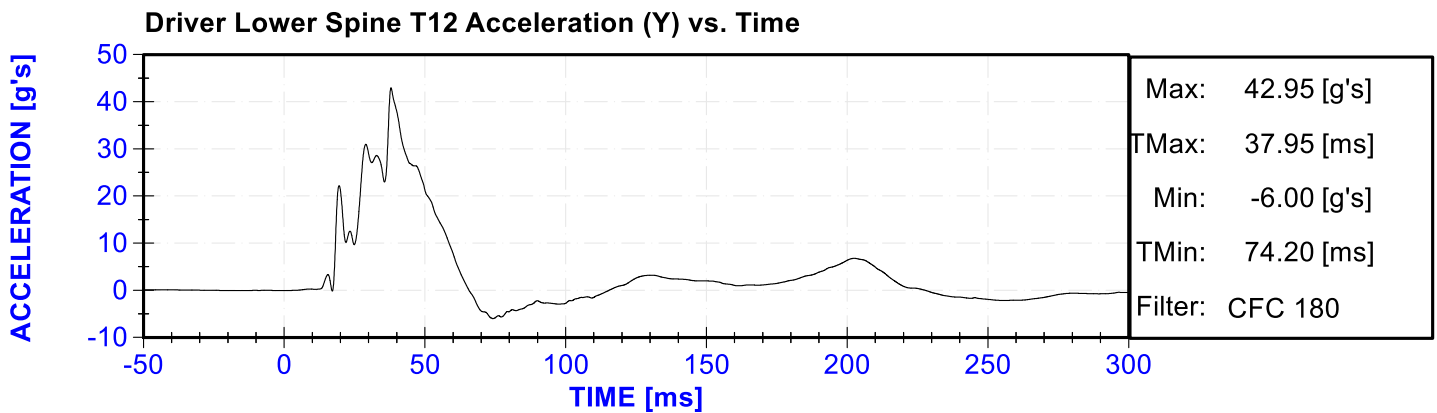
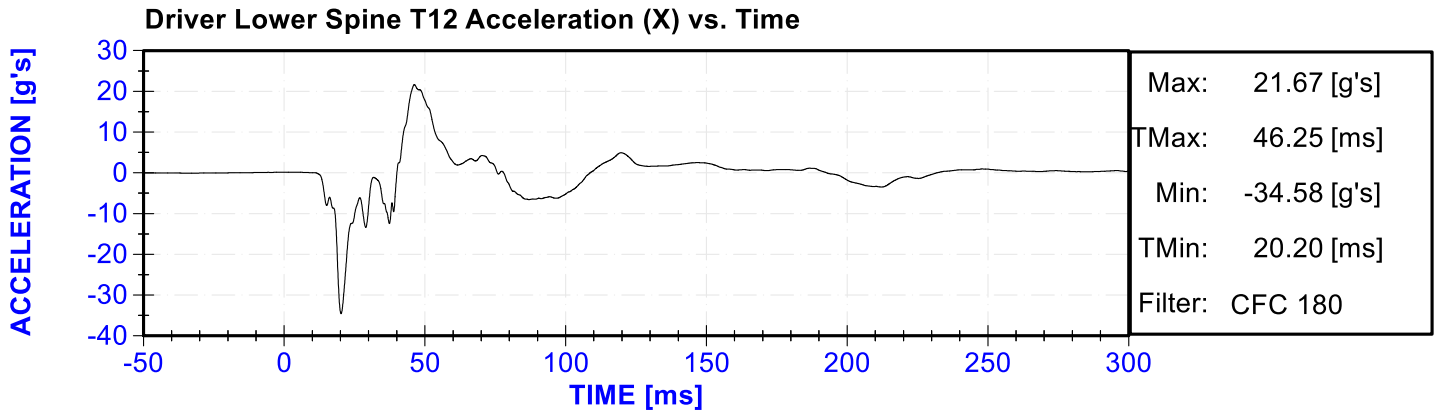
### **Vehicle Instrumentation Data**

Vehicle Center of Gravity Acceleration (X)  
Vehicle Center of Gravity Acceleration (Y)  
Vehicle Center of Gravity Acceleration (Z)  
Left Floor Sill Acceleration (Y)  
Left A-Pillar Sill Acceleration (Y)  
Left Lower A-Pillar Acceleration (Y)  
Left Mid A-Pillar Acceleration (Y)  
Left B-Pillar Sill Acceleration (Y)  
Left Lower B-Pillar Acceleration (Y)  
Left Mid B-Pillar Acceleration (Y)  
Driver Seat Track at Dummy Hip Point Acceleration (Y)  
Engine Top Acceleration (X)  
Engine Top Acceleration (Y)  
Firewall Center Acceleration (Y)  
Right Roof at Vertical Impact Reference Line Acceleration (Y)  
Right Sill at Vertical Impact Reference Line Acceleration (Y)  
Rear Floorpan Behind Rear Axle at Centerline Acceleration (X)  
Rear Floorpan Behind Rear Axle at Centerline Acceleration (Y)

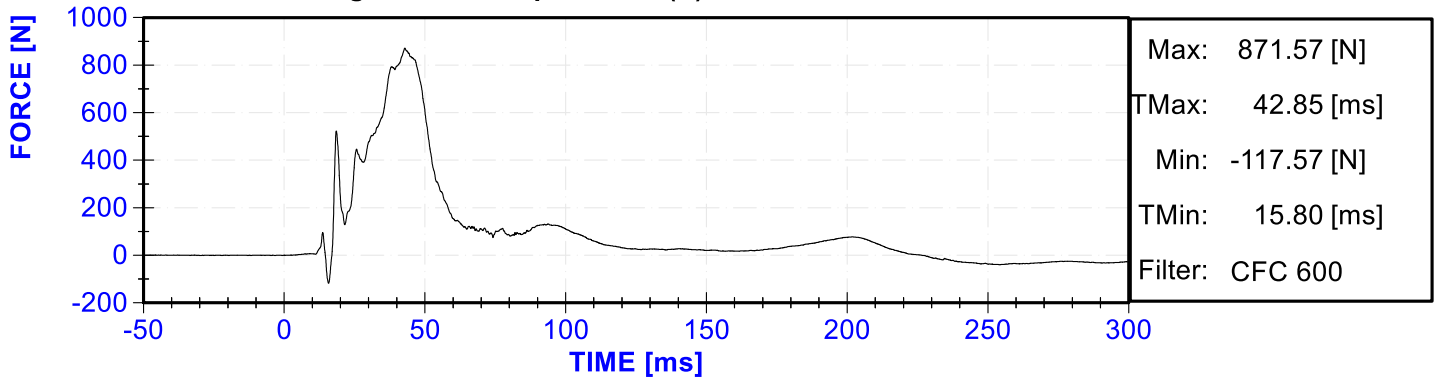
### **Pole Instrumentation Data**

Load Cell Pole Barrier #1 Force (Y)  
Load Cell Pole Barrier #2 Force (Y)  
Load Cell Pole Barrier #3 Force (Y)  
Load Cell Pole Barrier #4 Force (Y)  
Load Cell Pole Barrier #5 Force (Y)  
Load Cell Pole Barrier #6 Force (Y)  
Load Cell Pole Barrier #7 Force (Y)  
Load Cell Pole Barrier #8 Force (Y)

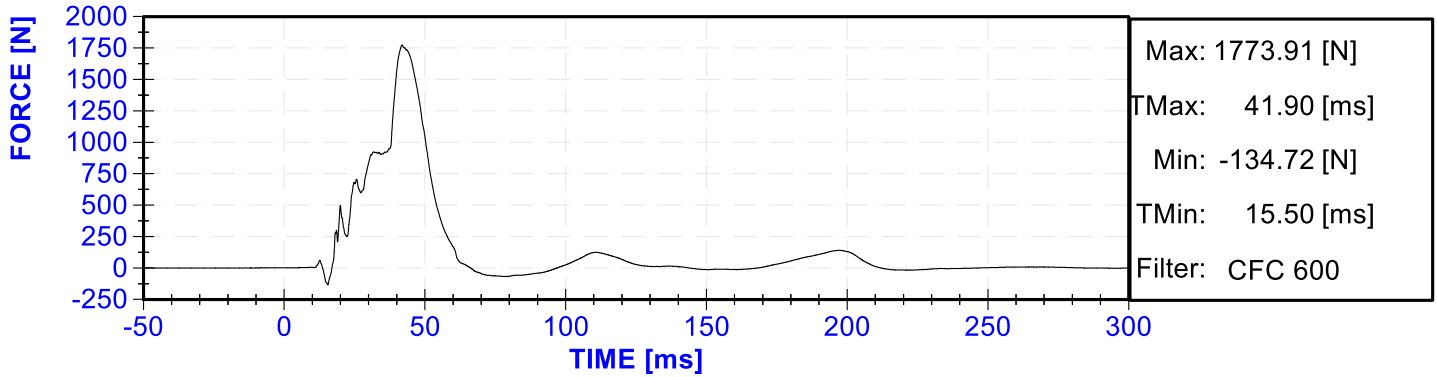




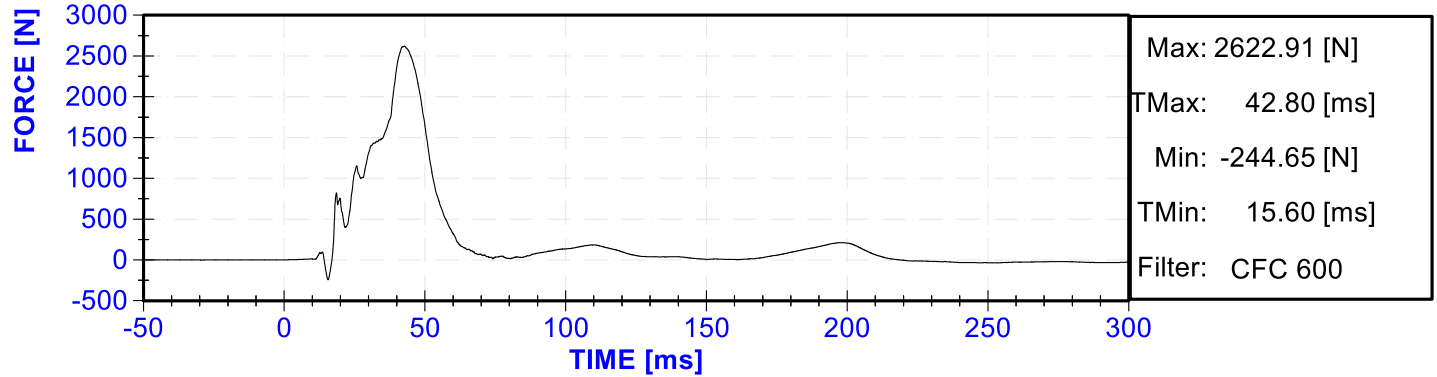
Driver Iliac Wing Force on Impact Side (Y) vs. Time



Driver Acetabulum Force on Impact Side (Y) vs. Time



Driver Total Pelvis Force on Impact Side (Y) vs. Time



**APPENDIX C**

**DUMMY CONFIGURATION AND PERFORMANCE VERIFICATION DATA**

**CALIBRATION TEST RESULTS**

**PRE-TEST**

**SID-IIS 5<sup>TH</sup> PERCENTILE FEMALE - DRIVER ATD**

**SERIAL NO: DG8012**

**(CONFIGURED FOR LEFT SIDE IMPACT)**

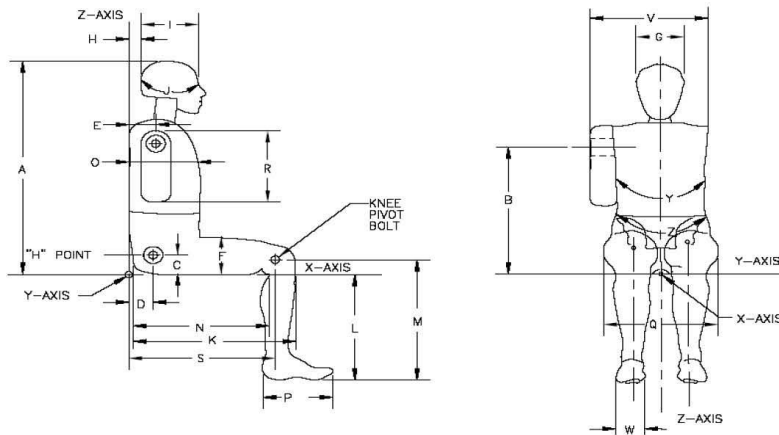


External Measurements - SID-IIs

Technician: K. Brogan

Date: 6/6/2018

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	84	Pass
D	H-point from seatback	141	151	146	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	129	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	43	Pass
I	Head Depth	178	188	182	Pass
J	Head Circumference	541	551	548	Pass
K	Buttock to Knee Length	514	540	529	Pass
L	Popliteal Height	343	369	354	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	430	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	318	Pass
R	Arm Length	249	259	253	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	350	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	863	Pass
Z	Waist Circumference	761	791	770	Pass

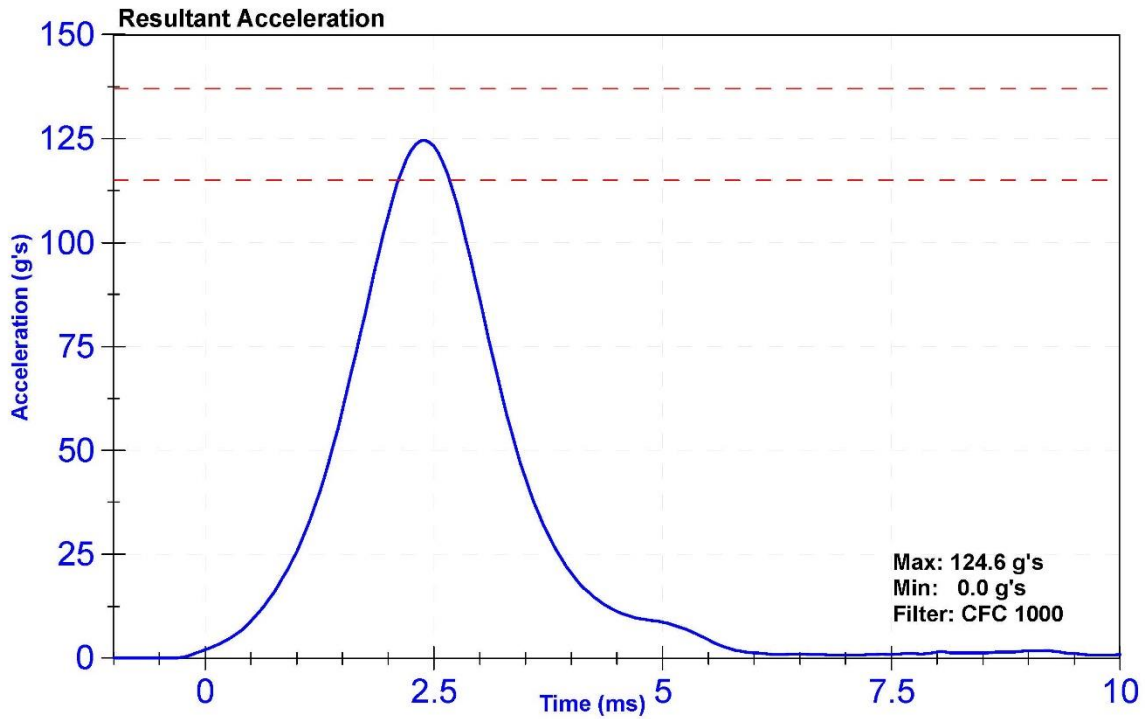
ATD Manufacturer	FTSS	Test Technician	S. Keller
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

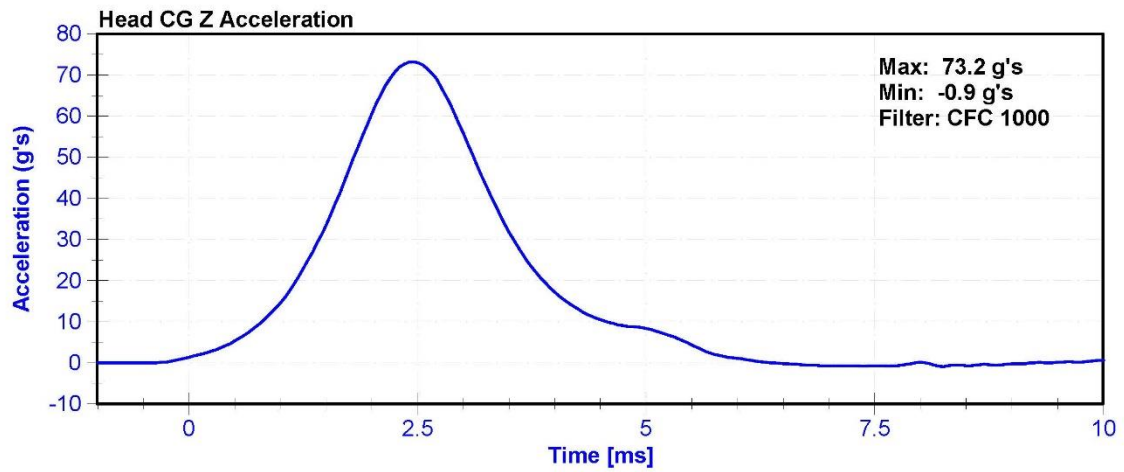
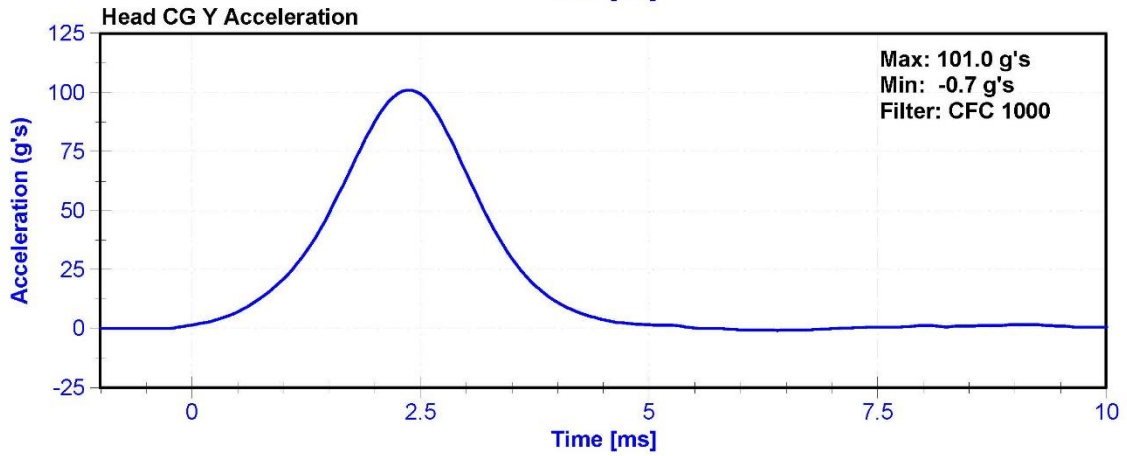
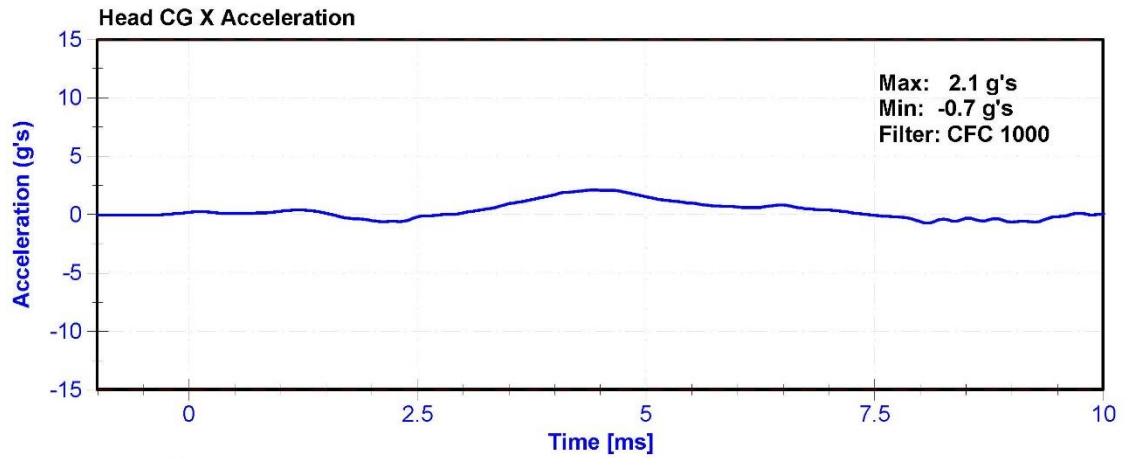
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	20.9	Pass
Humidity	10	70	%	42.9	Pass
Resultant Acceleration	115	137	g's	124.6	Pass
Oscillation	0	15	%	1.4	Pass
Fore-Aft Acceleration	-15	15	g's	2.1	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	5/4/2018	11/2/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	5/4/2018	11/2/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	5/4/2018	11/2/2018





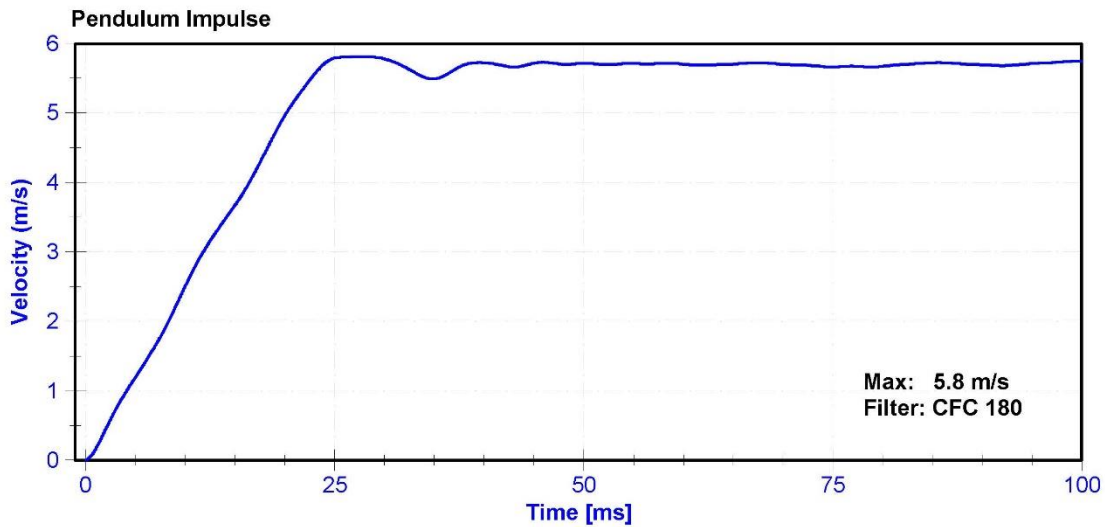
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

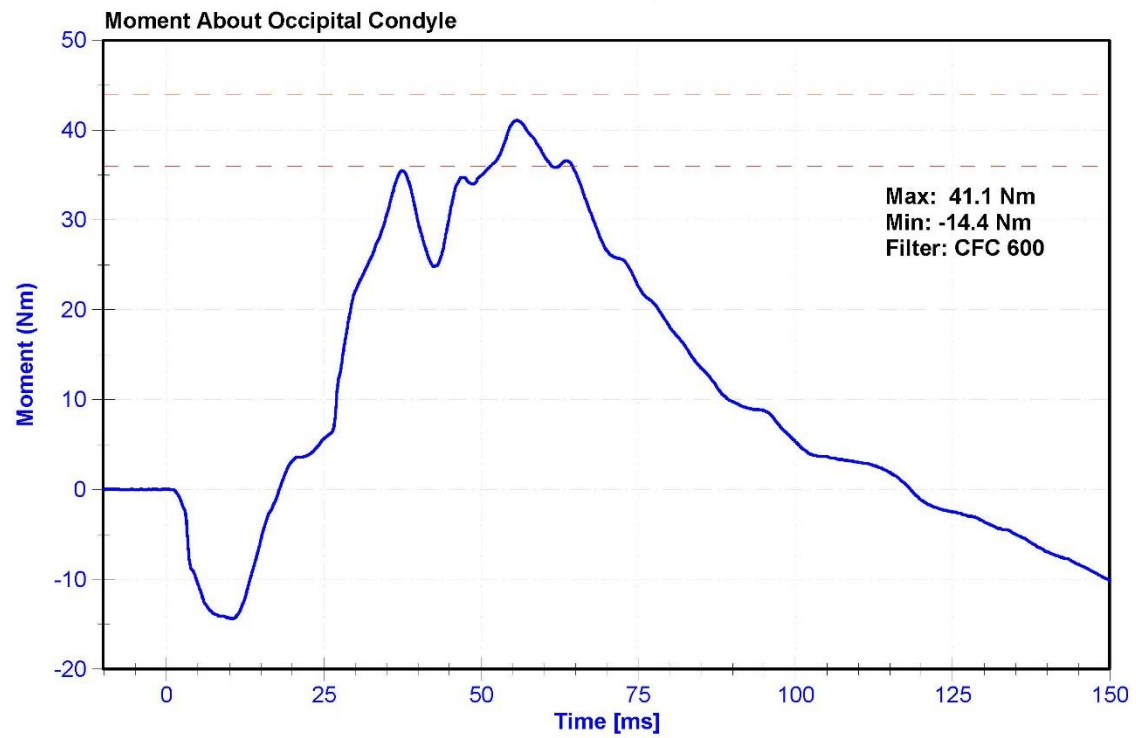
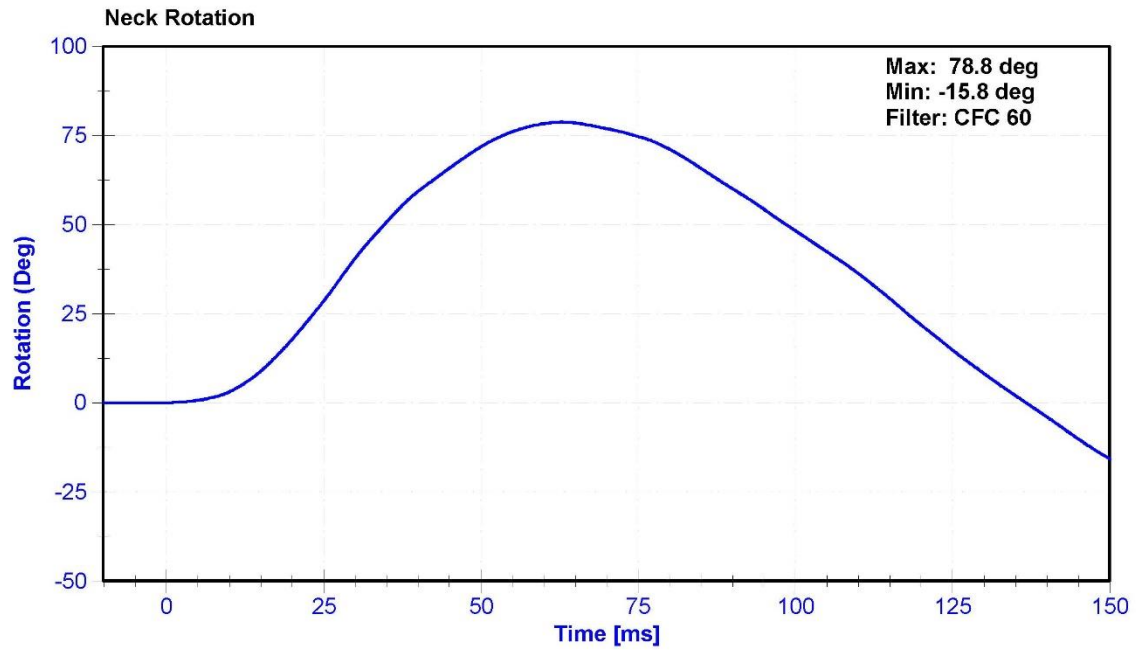
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	44.9	Pass
Velocity	5.51	5.63	m/s	5.583	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.51	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.67	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.96	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.79	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.81	Pass
Neck Rotation	71	81	deg	78.8	Pass
Time at Maximum Rotation	50	70	ms	62.8	Pass
Moment about the OC	36	44	Nm	41.1	Pass
Moment Decay to 0 Nm	102	126	ms	118.3	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	10/27/2017	10/27/2018
Condyle Potentiometer	Denton 78051-342	DS-185Pend	10/27/2017	10/27/2018
Upper Neck Load Cell	Denton 1716	LC-1872 FY	7/26/2017	7/26/2018





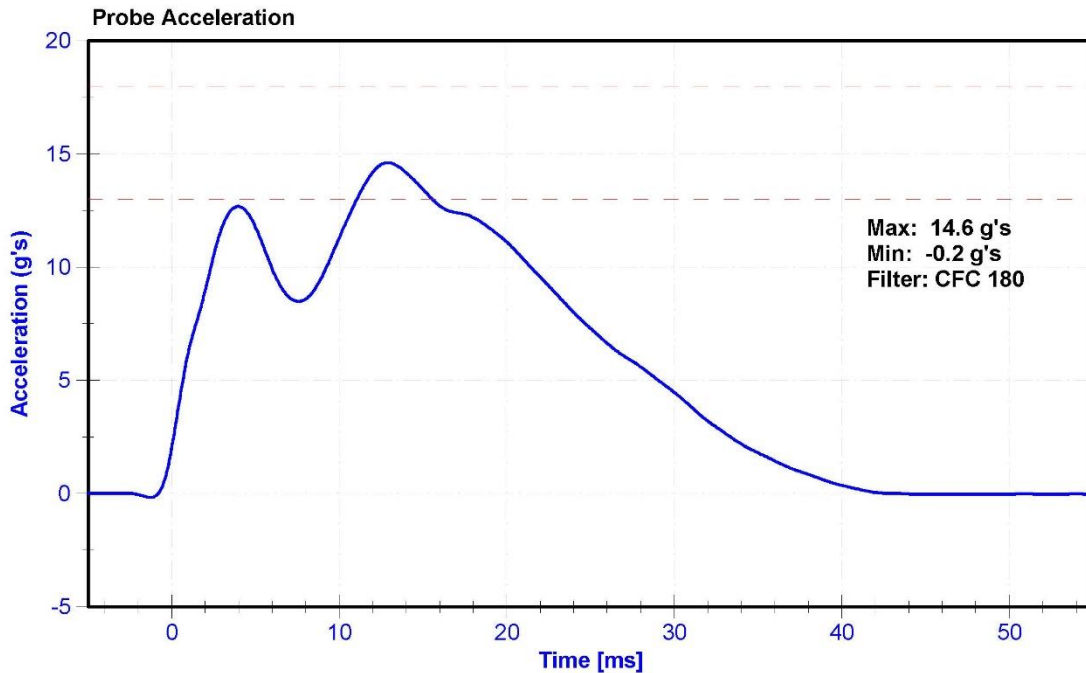
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

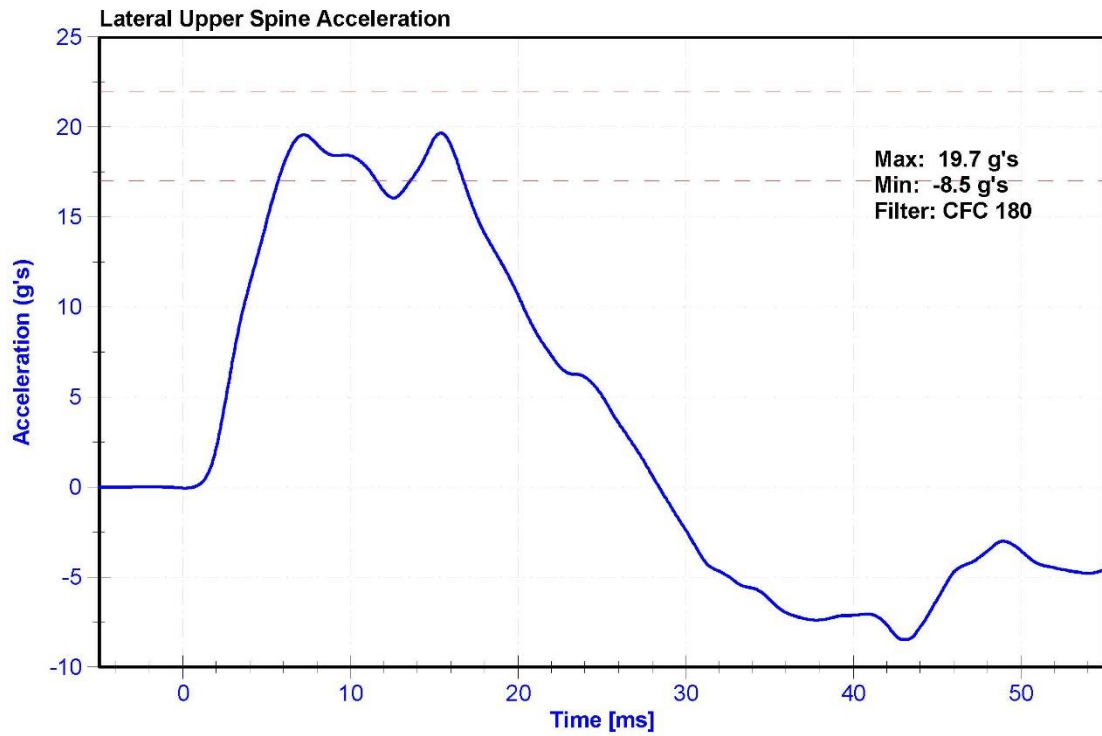
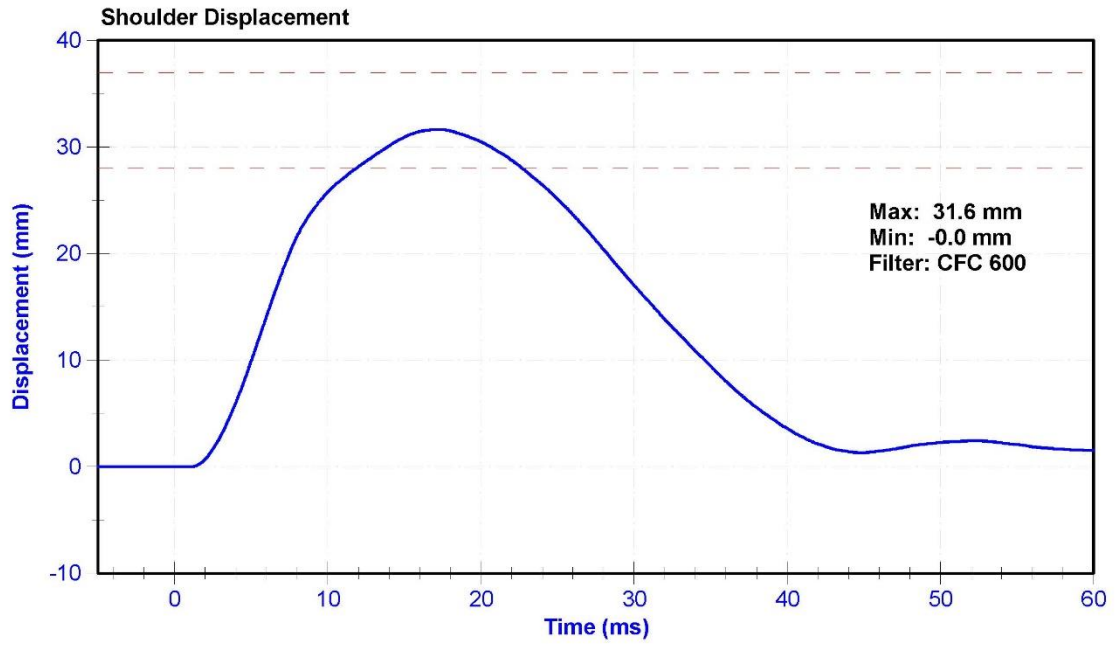
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	39.8	Pass
Velocity	4.2	4.4	m/s	4.40	Pass
Probe Acceleration	13	18	g's	14.6	Pass
Shoulder Deflection	28	37	mm	31.6	Pass
Lateral Upper Spine Acceleration	17	22	g's	19.7	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/27/2017	9/27/2018
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018





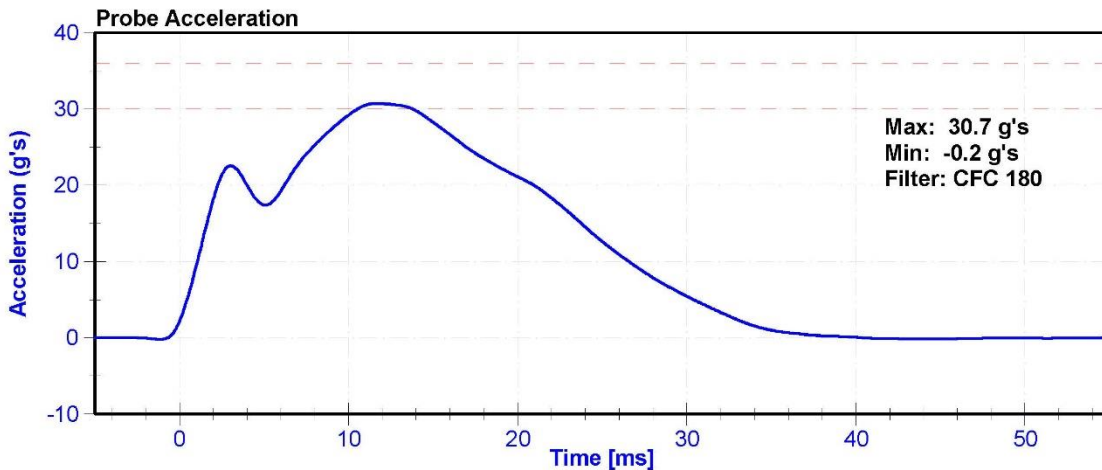
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

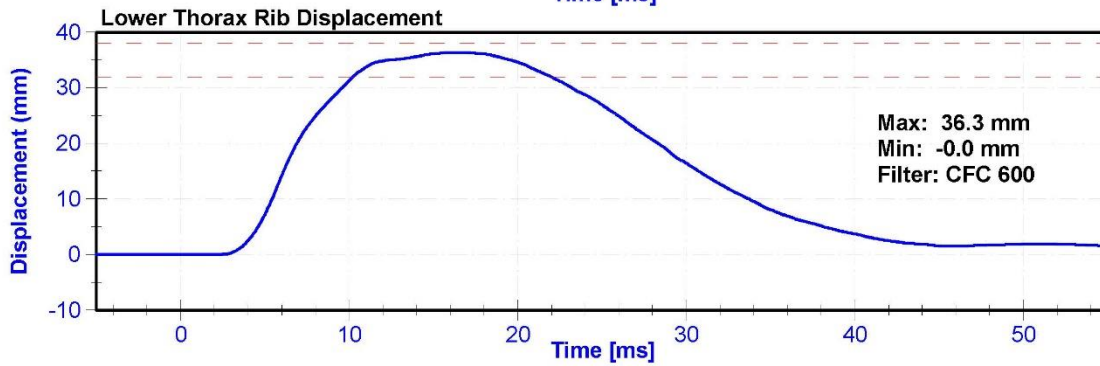
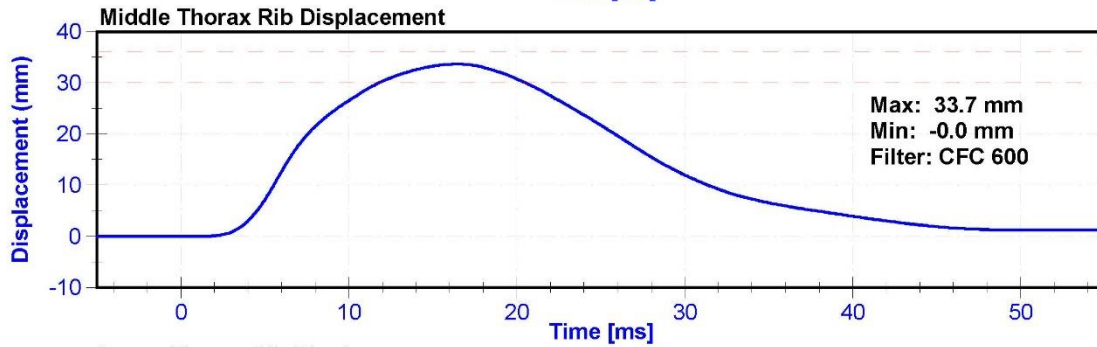
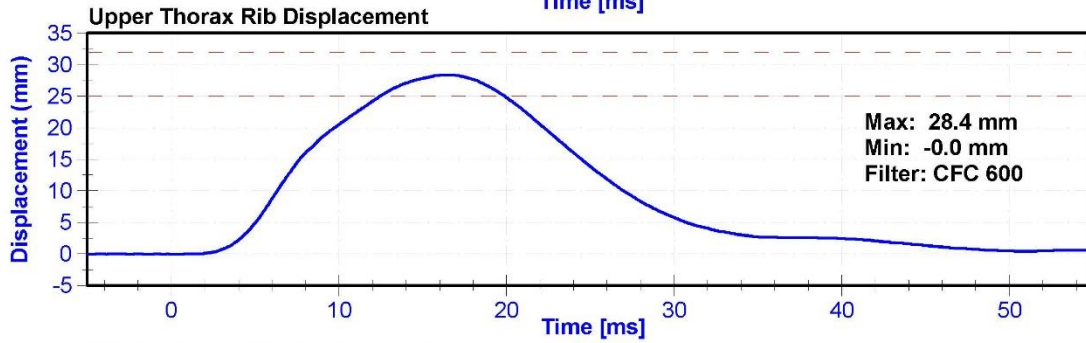
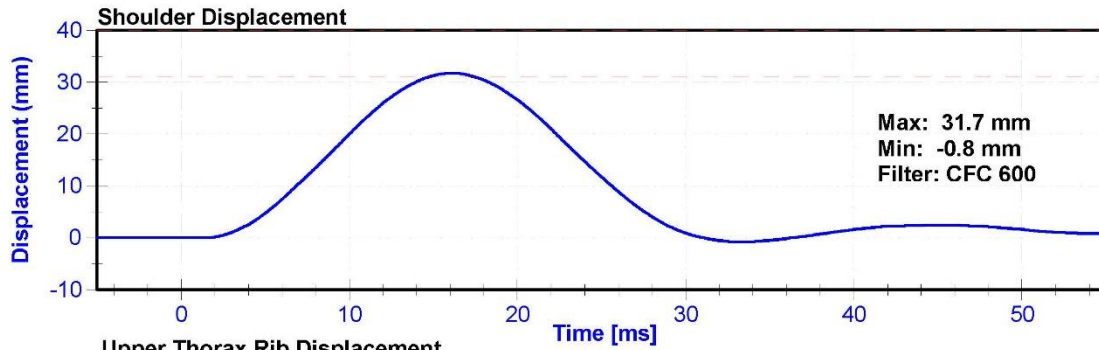
**Results**

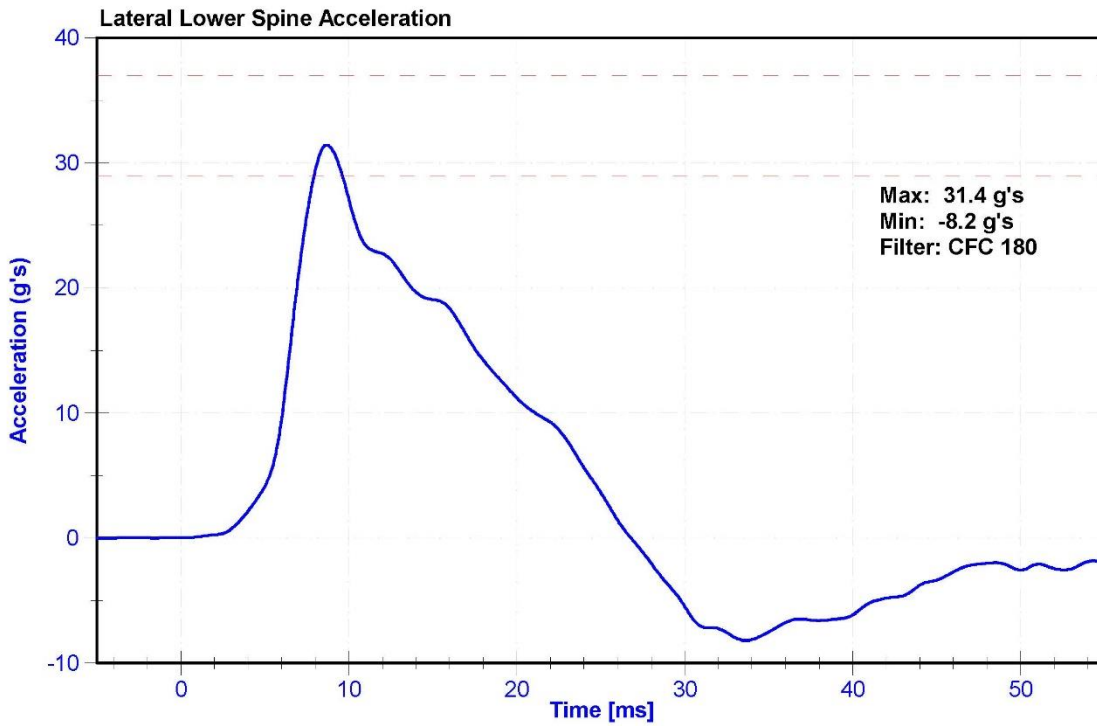
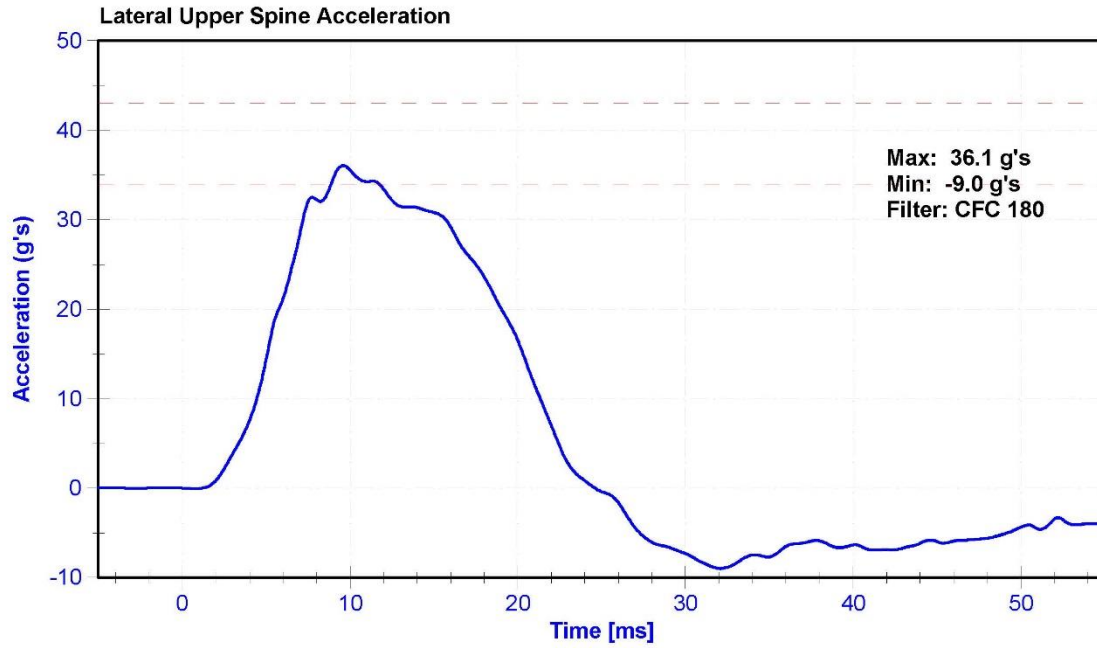
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.5	Pass
Humidity	10	70	%	41.9	Pass
Velocity	6.6	6.8	m/s	6.79	Pass
Probe Acceleration after 5 ms	30	36	g's	30.7	Pass
Lateral Upper Spine Acceleration	34	43	g's	36.1	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.4	Pass
Shoulder Deflection	31	40	mm	31.7	Pass
Upper Thorax Rib Deflection	25	32	mm	28.4	Pass
Mid Thorax Rib Deflection	30	36	mm	33.7	Pass
Lower Thorax Rib Deflection	32	38	mm	36.3	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/27/2017	9/27/2018
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	12/11/2017	12/11/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/27/2017	9/27/2018







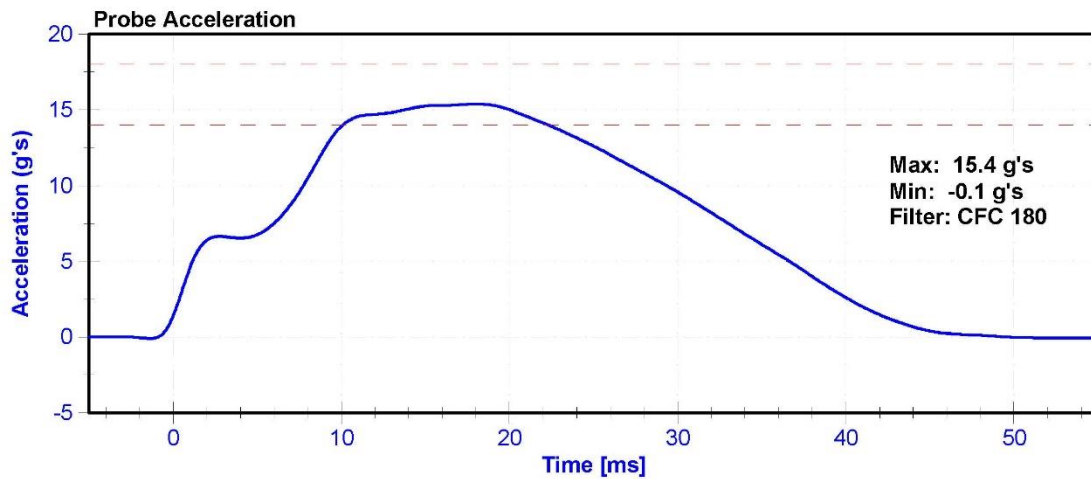
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

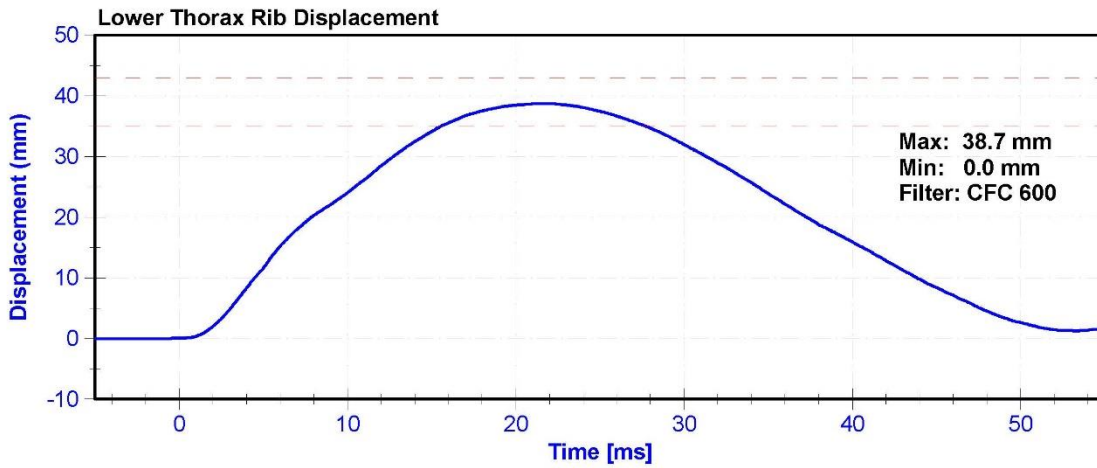
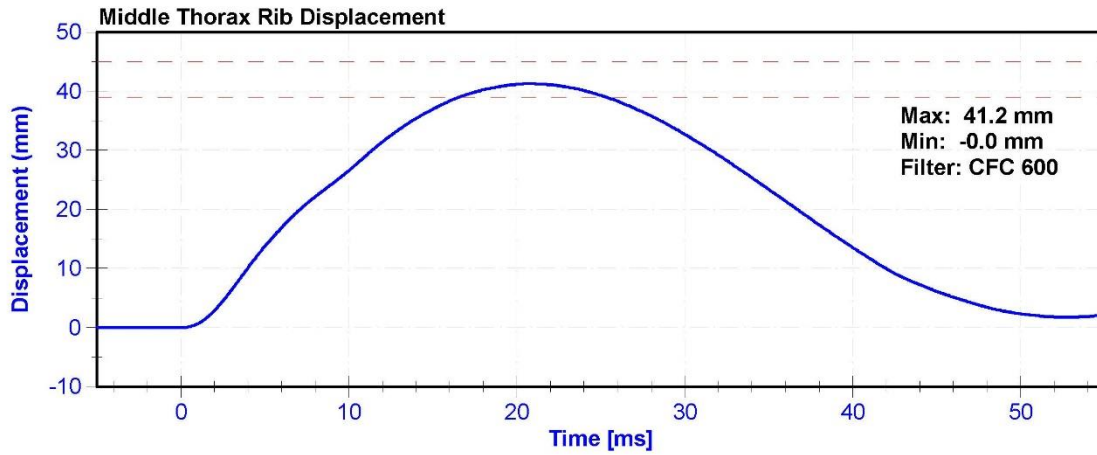
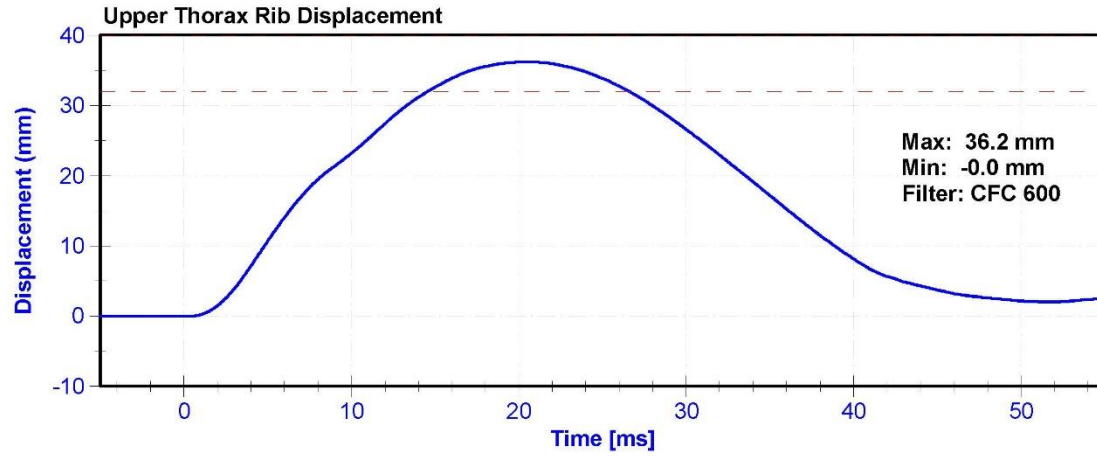
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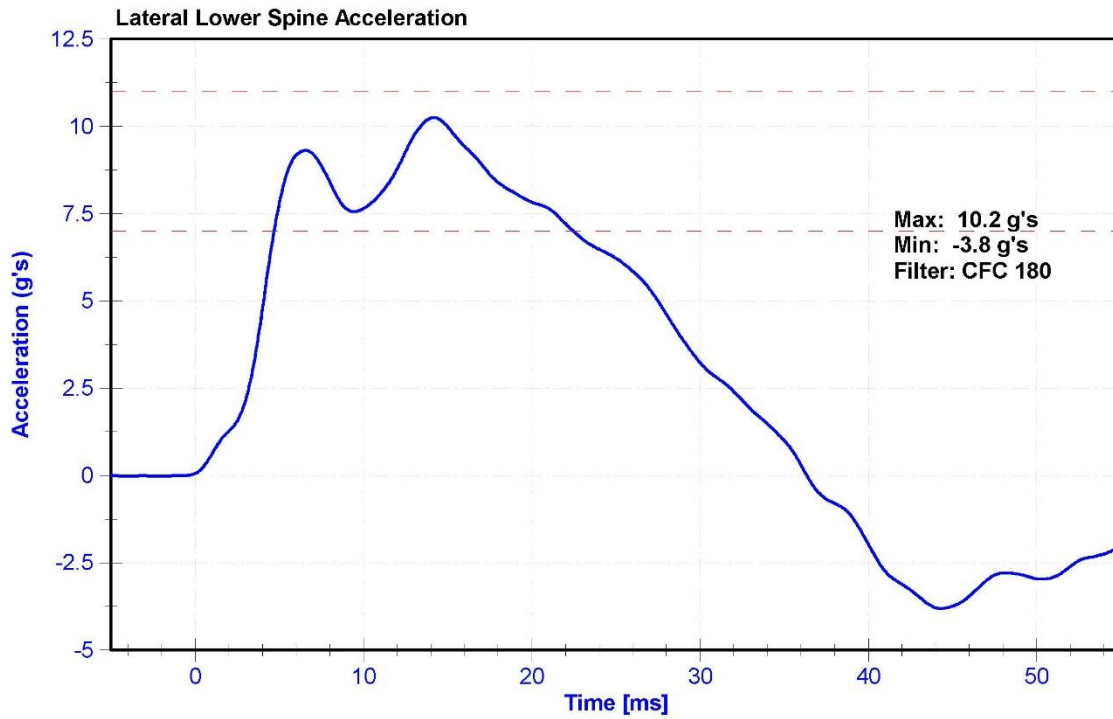
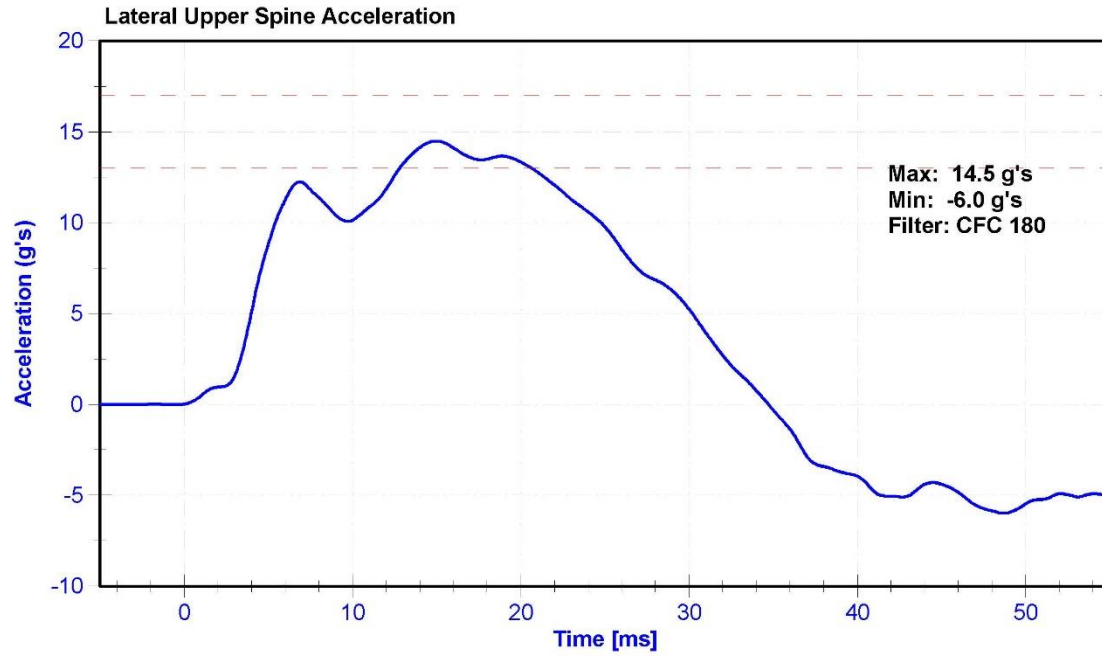
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.4	Pass
Humidity	10	70	%	43.2	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	14	18	g's	15.4	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.5	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.2	Pass
Upper Thorax Rib Deflection	32	40	mm	36.2	Pass
Middle Thorax Rib Deflection	39	45	mm	41.2	Pass
Lower Thorax Rib Deflection	35	43	mm	38.7	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	12/11/2017	12/11/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/27/2017	9/27/2018







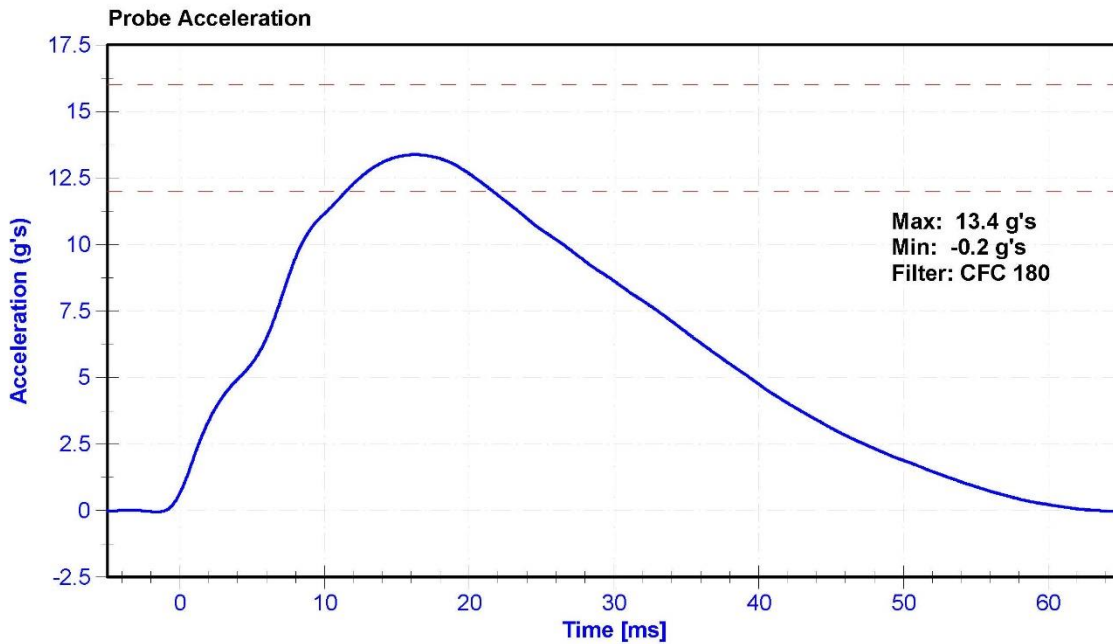
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

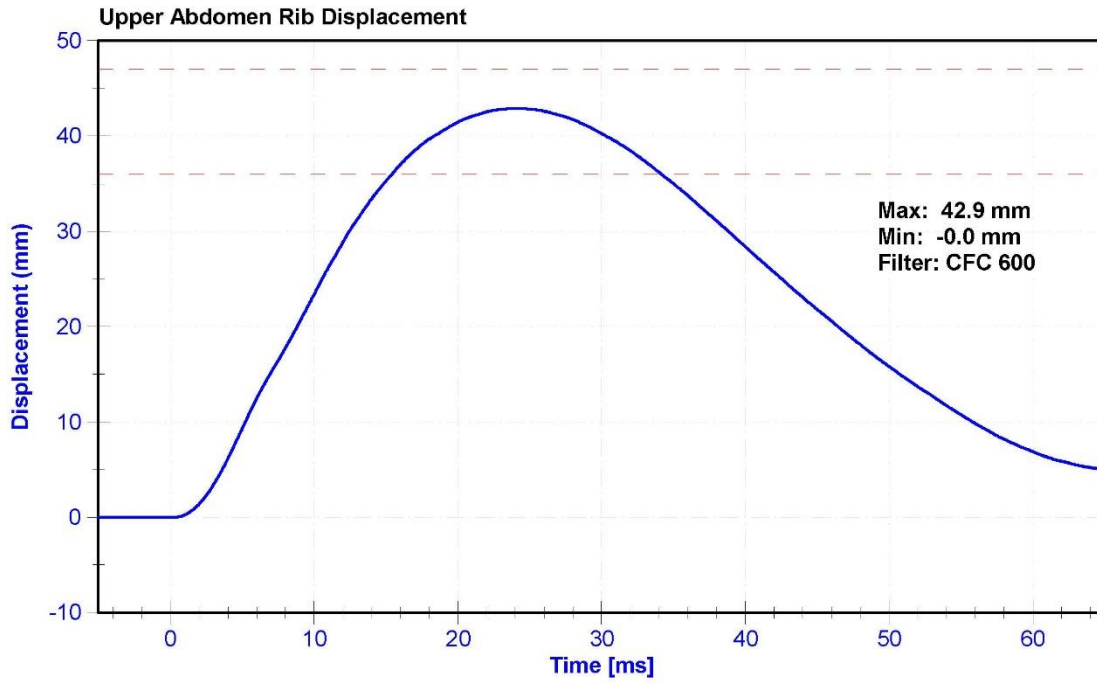
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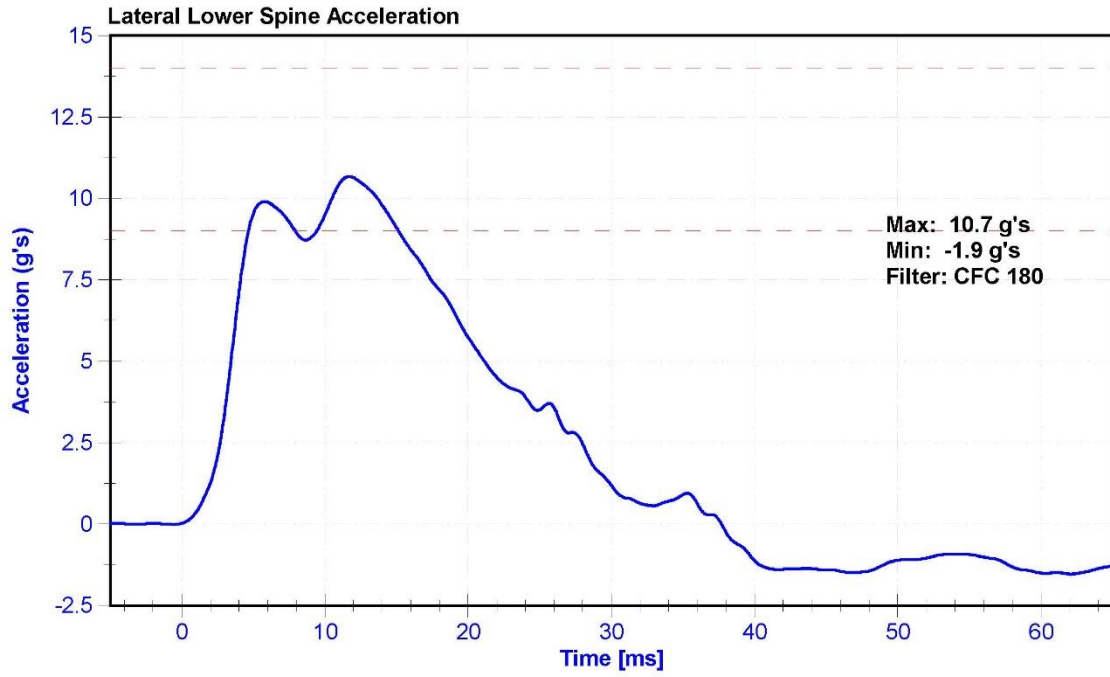
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	43.9	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	12	16	g's	13.4	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.7	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.9	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.7	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	9/27/2017	9/27/2018
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/27/2017	9/27/2018







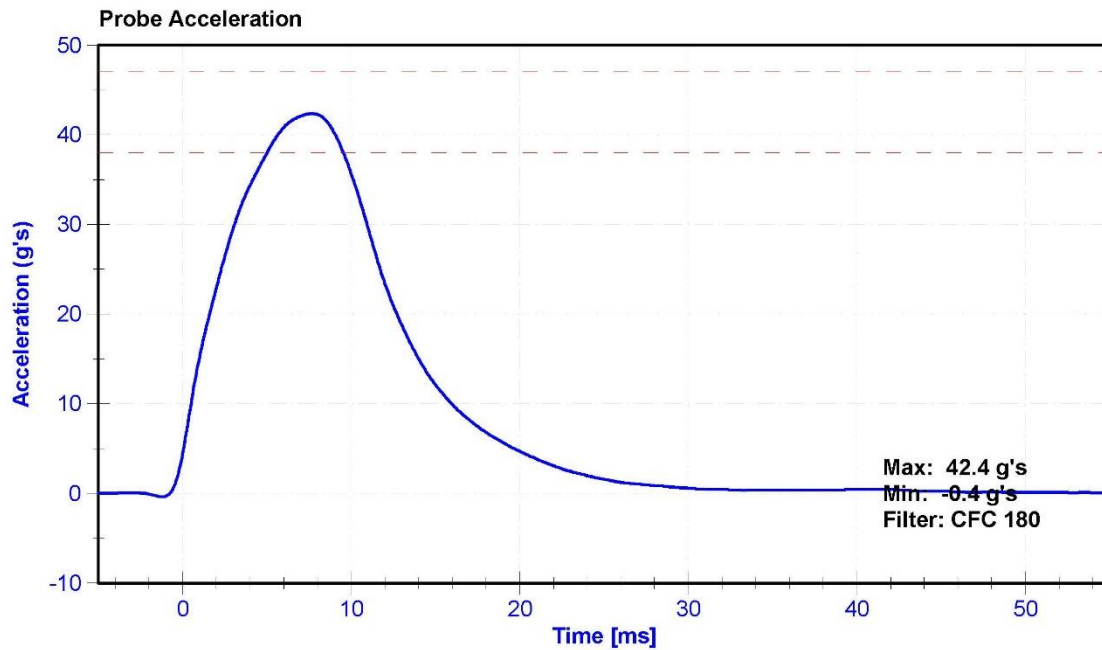
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

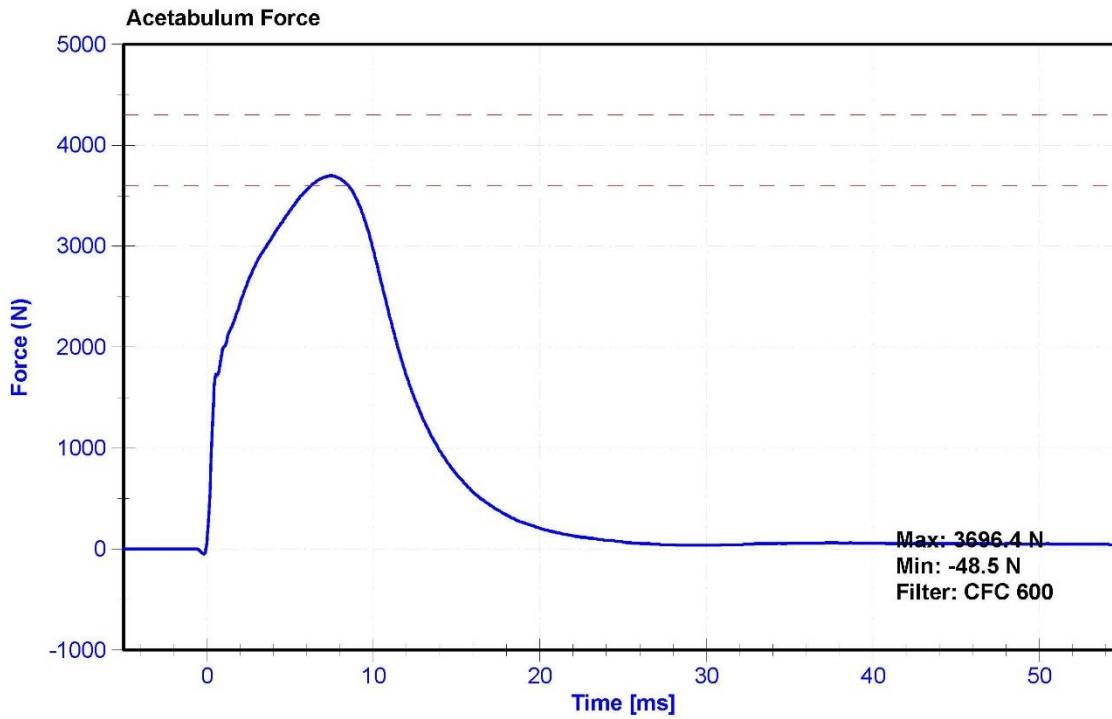
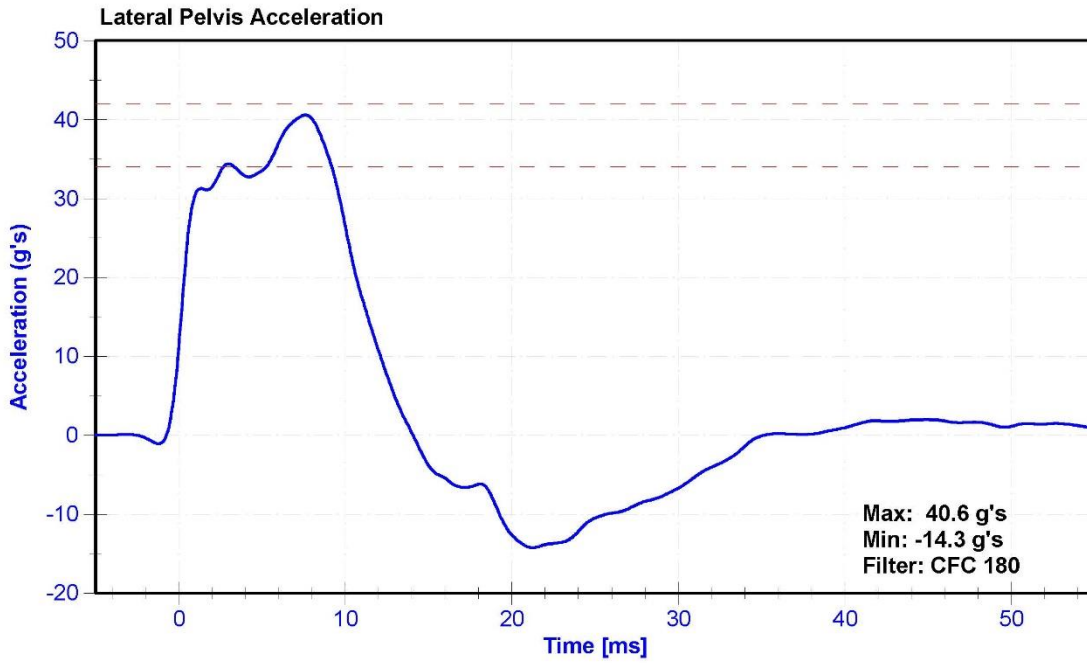
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.9	Pass
Humidity	10	70	%	42.5	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration	38	47	g's	42.4	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	40.6	Pass
Acetabulum Force	3600	4300	N	3696.4	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	5/4/2018	11/2/2018
Acetabulum Load Cell	Denton 3249J	LC-4986Fy	6/4/2018	6/4/2019
Certification Plug	Humanetics	11991	02/06/2018	N/A
Crash Test Plug	Humanetics	11436	08/29/2016	N/A







DC 2012 Crash 6-7-2018

**SID-11s Pelvis Plug Certification Test**

Plug S/N 11436

Test Number 2905

Report Number 2902

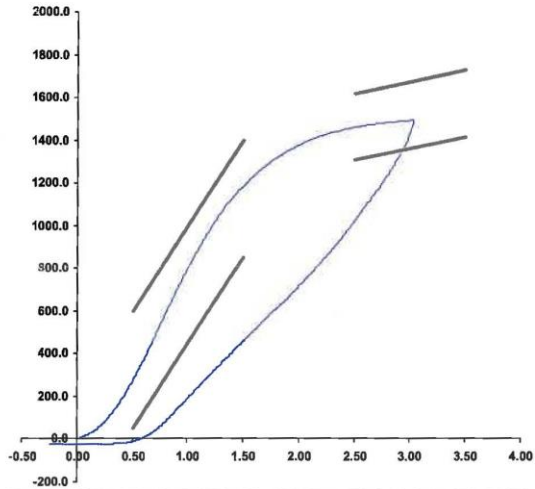
Test Date 8/29/2016 11:29:01 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	280.58	50.00	600.00
Force @ 1.5 mm (N)	1,190.08	850.00	1,400.00
Force @ 2.5 mm (N)	1,460.21	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,492.40	1,361.00	1,673.00

Testing Machine STM-20 5965542  
 Load Cell S/N (T1240813), Units (LBS ) 1000  
 Crosshead Speed ( mm / min ) or Rate 12.7  
 Extension or Position Measured by XHD\_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator DC

Part Number 180-4450

Template No 107 29-Aug-16  
 SACO Research

By: DC Date: 8/29/16

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX



DCS12 Test 6-7-2018

SID-Its Pelvis Plug Certification Test

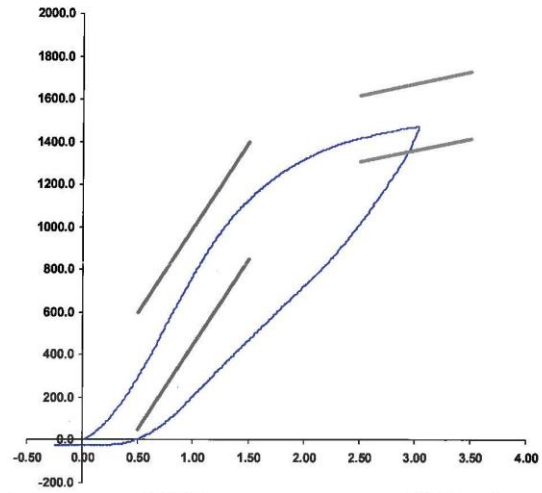
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Test Number 6208  
Report Number 6225  
Test Date 2/6/2018 9:46:04 AM

	Test Results	Spec Min	Spec Max
Force @ 0.5 mm (N)	296.21	50.00	600.00
Force @ 1.5 mm (N)	1,132.87	850.00	1,400.00
Force @ 2.5 mm (N)	1,416.86	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,470.58	1,361.00	1,673.00

Testing Machine STM-20 5965542  
 Load Cell S/N (F1360947), Units (LBS ) 1000  
 Preload Value (-N) 22.24  
 Crosshead Speed ( mm / min ) or Rate 12.7  
 Extension or Position Measured by XHD\_100 (XHD100)

Notes:

Force (-N) vs Extension (-mm)



Operator \_\_\_\_\_  
 Part Number 180-4450

Template No 107 08-Feb-18  
 SACO Research

By: DC Date: 2/6/18  
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

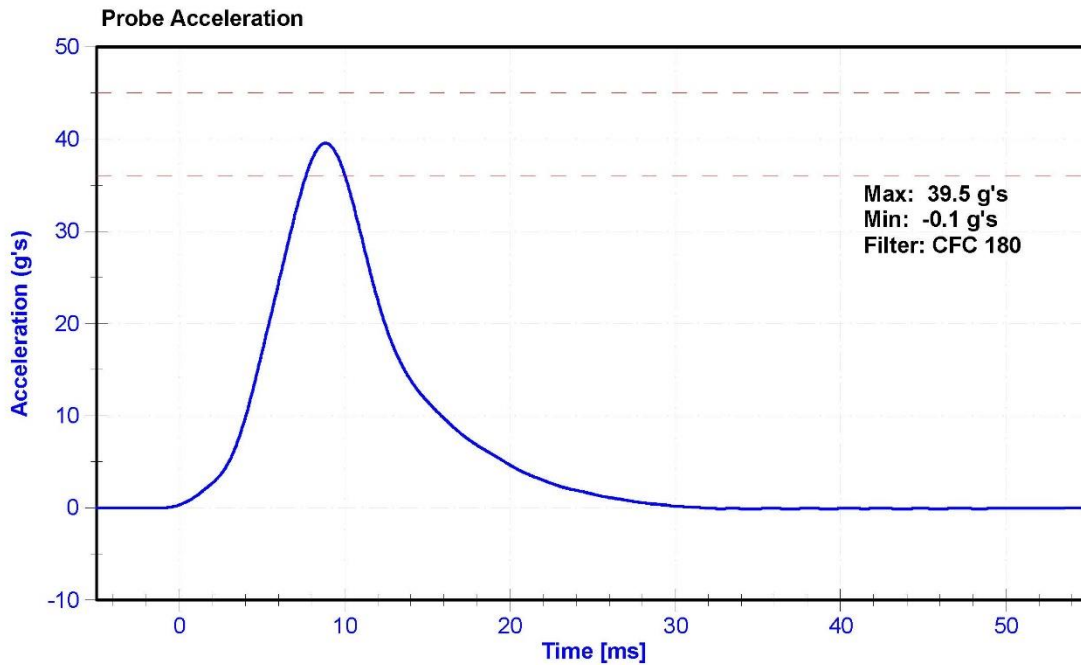
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K.Brogan

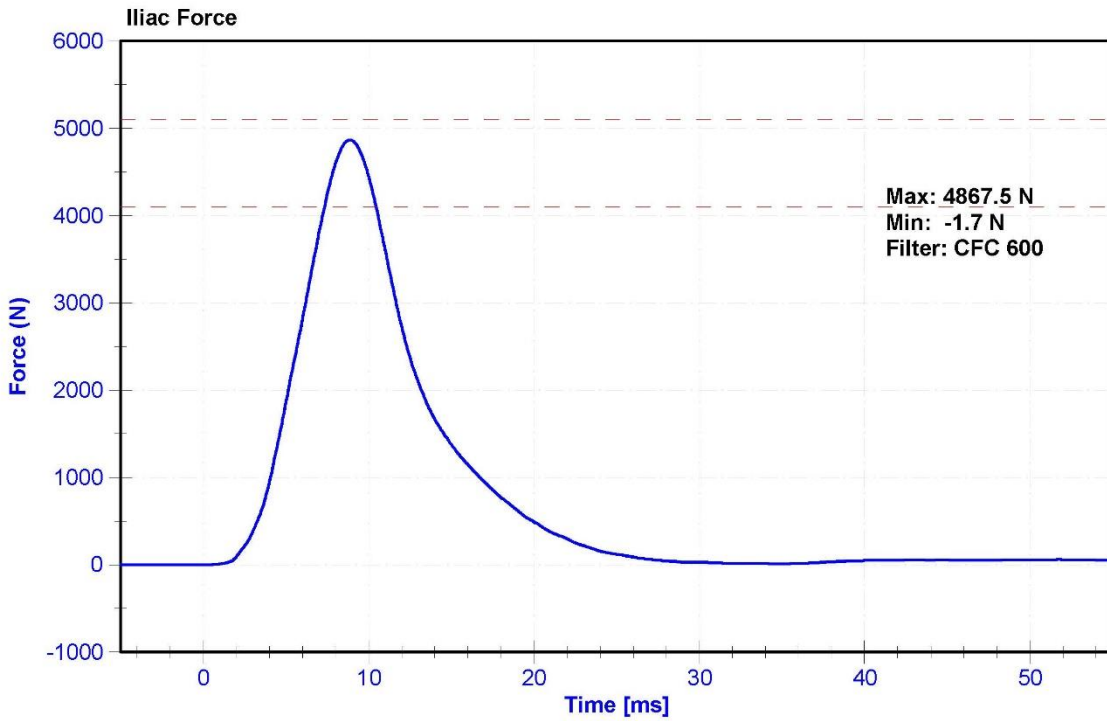
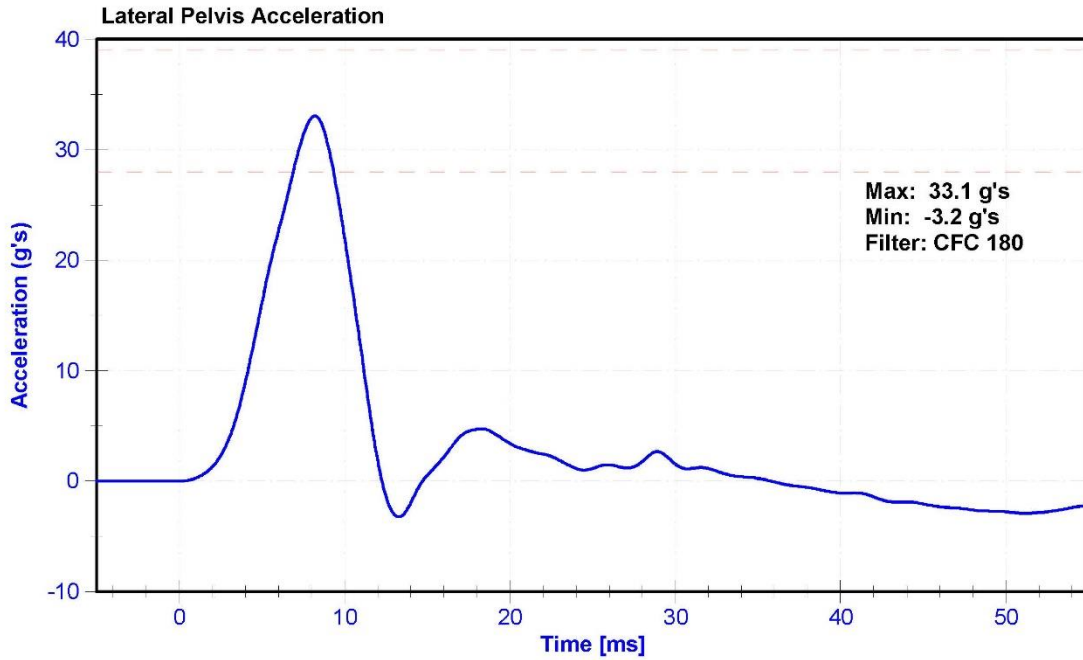
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.7	Pass
Humidity	10	70	%	43.2	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	36	45	g's	39.5	Pass
Lateral Pelvis Acceleration	28	39	g's	33.1	Pass
Iliac Force	4100	5100	N	4867.5	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	5/4/2018	11/2/2018
Iliac Load Cell	DENTON 3228J	LC-113Fy	6/4/2018	6/4/2019





**CALIBRATION TEST RESULTS**

**POST-TEST**

**SID-IIS 5<sup>TH</sup> PERCENTILE FEMALE - DRIVER ATD**

**SERIAL NO: DG8012**

**(CONFIGURED FOR LEFT SIDE IMPACT)**

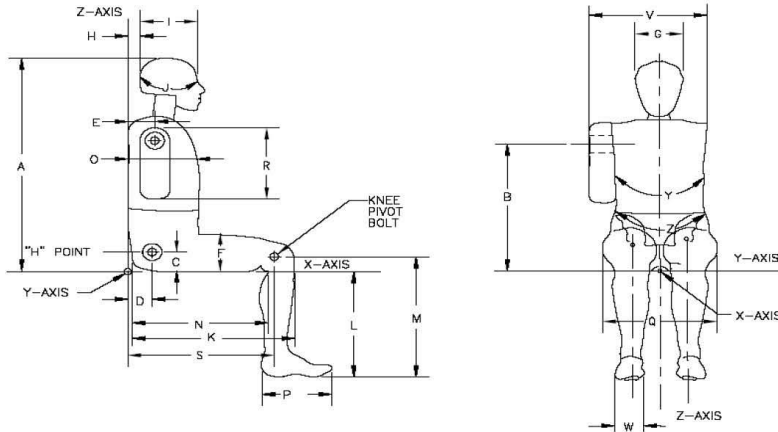


External Measurements - SID-IIs

Technician: K. Brogan

Date: 6/12/2018

Dummy Serial Number: DG8012



Symbol	Description	Specification (mm)		Result (mm)	Pass/Fail
A	Sitting Height	772	788	782	Pass
B	Shoulder Pivot Height	437	453	445	Pass
C	H-point Height	79	89	85	Pass
D	H-point from seatback	141	151	147	Pass
E	Shoulder Pivot from Backline	97	107	103	Pass
F	Thigh Clearance	119	135	129	Pass
G	Head Breadth	140	148	143	Pass
H	Head Back from Backline	40	46	44	Pass
I	Head Depth	178	188	183	Pass
J	Head Circumference	541	551	545	Pass
K	Buttock to Knee Length	514	540	531	Pass
L	Popliteal Height	343	369	354	Pass
M	Knee Pivot to floor height	392	409	400	Pass
N	Buttock Popliteal Length	416	442	429	Pass
O	Chest Depth w/o jacket	195	211	207	Pass
P	Foot Length	216	232	221	Pass
Q	Hip Breadth (w/pelvic plugs)	313	323	317	Pass
R	Arm Length	249	259	254	Pass
S	Knee Joint to seatback	477	493	485	Pass
V	Shoulder Width	341	357	345	Pass
W	Foot Width	78	94	85	Pass
Y	Chest Circumference w/jacket	851	881	865	Pass
Z	Waist Circumference	761	791	770	Pass

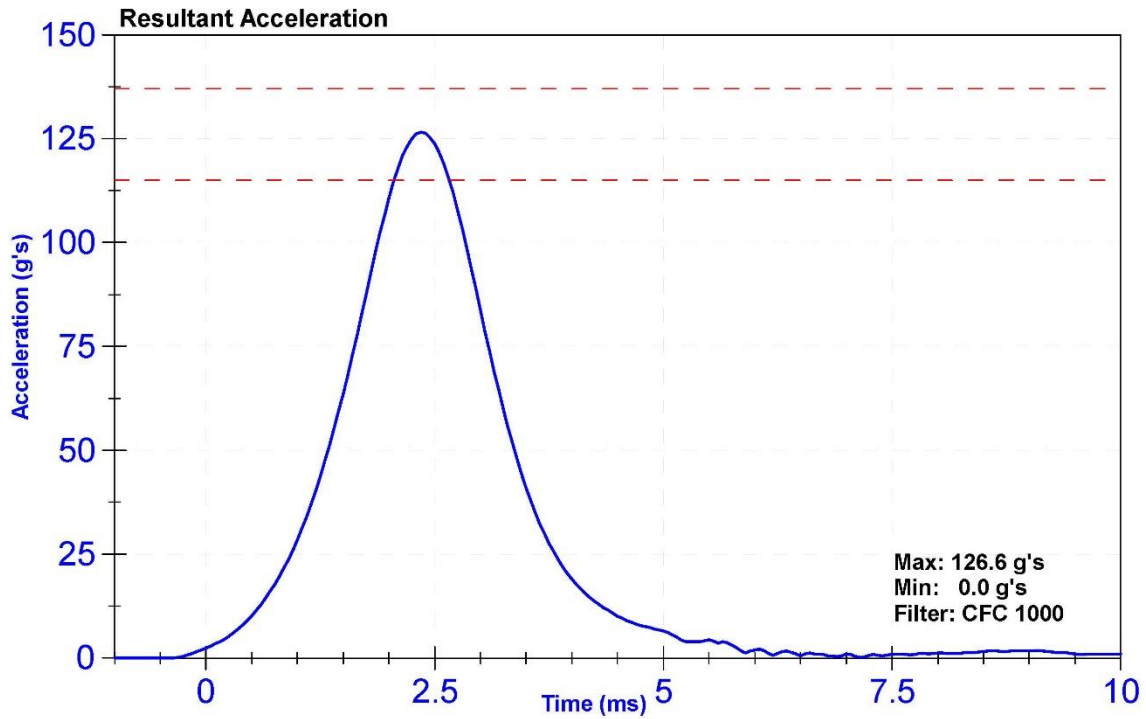
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

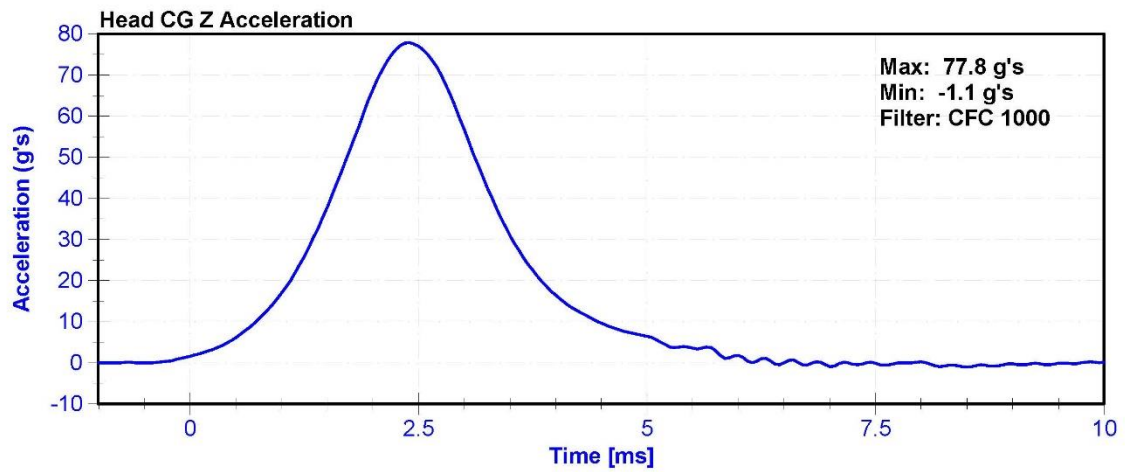
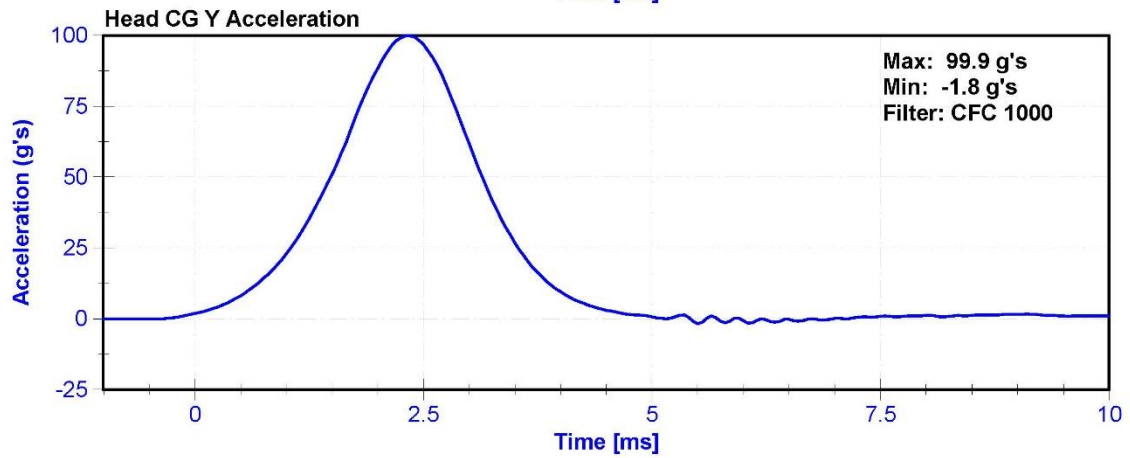
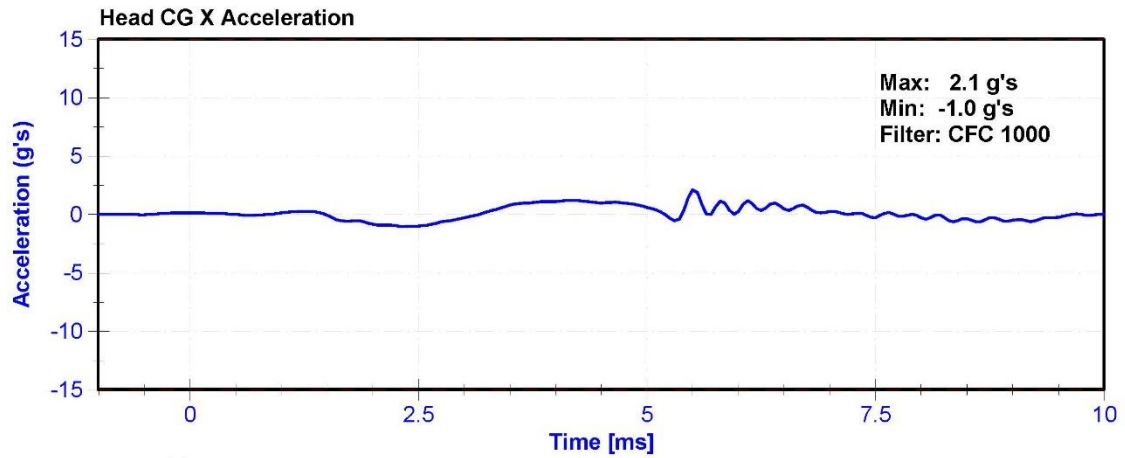
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.1	Pass
Humidity	10	70	%	58	Pass
Resultant Acceleration	115	137	g's	126.6	Pass
Oscillation	0	15	%	3.5	Pass
Fore-Aft Acceleration	-15	15	g's	2.1	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
X Accelerometer	ENDEVCO 7264CT	AC-P51685	5/4/2018	11/2/2018
Y Accelerometer	ENDEVCO 7264CT	AC-P51682	5/4/2018	11/2/2018
Z Accelerometer	ENDEVCO 7264CT	AC-P51699	5/4/2018	11/2/2018





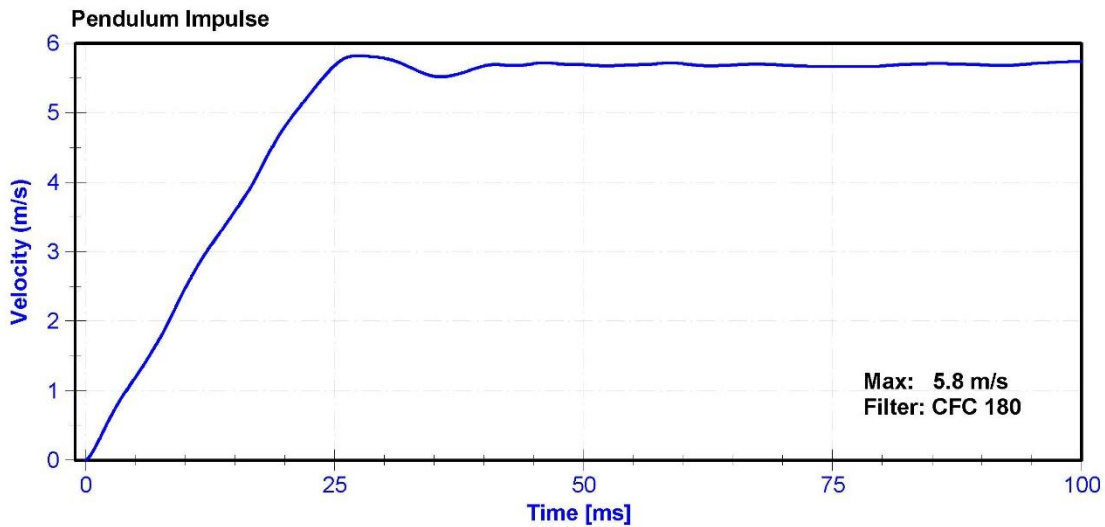
ATD Manufacturer	FTSS	Test Technician	J.Pericak
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

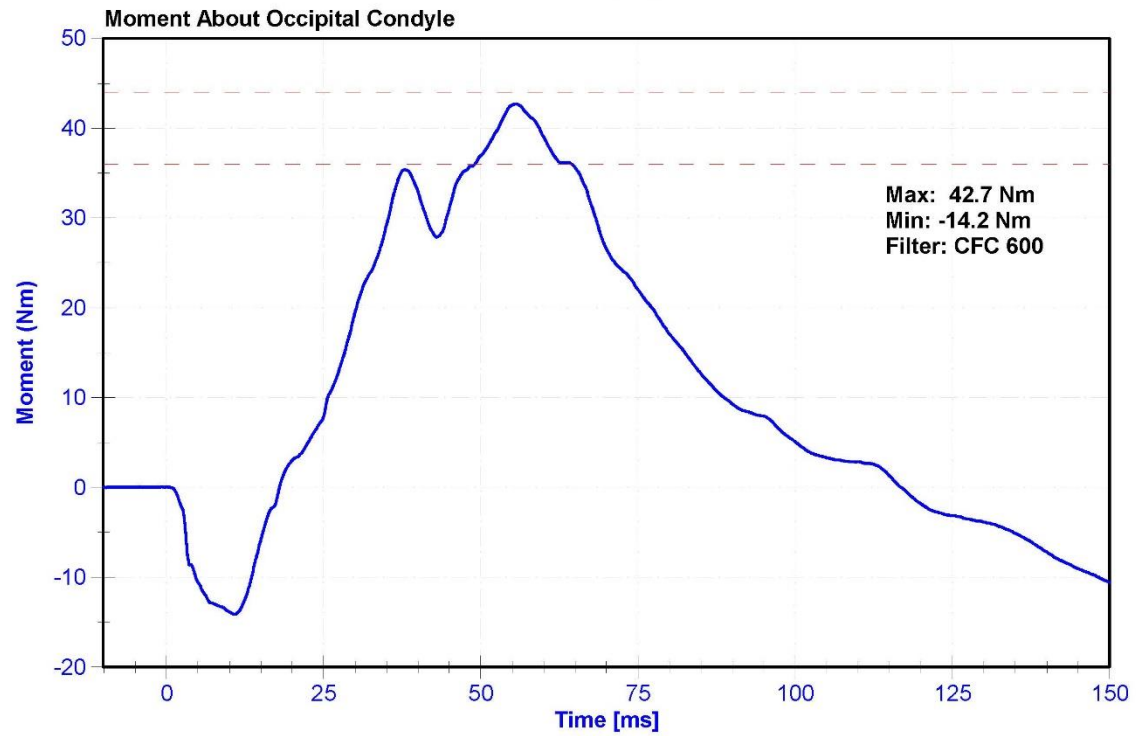
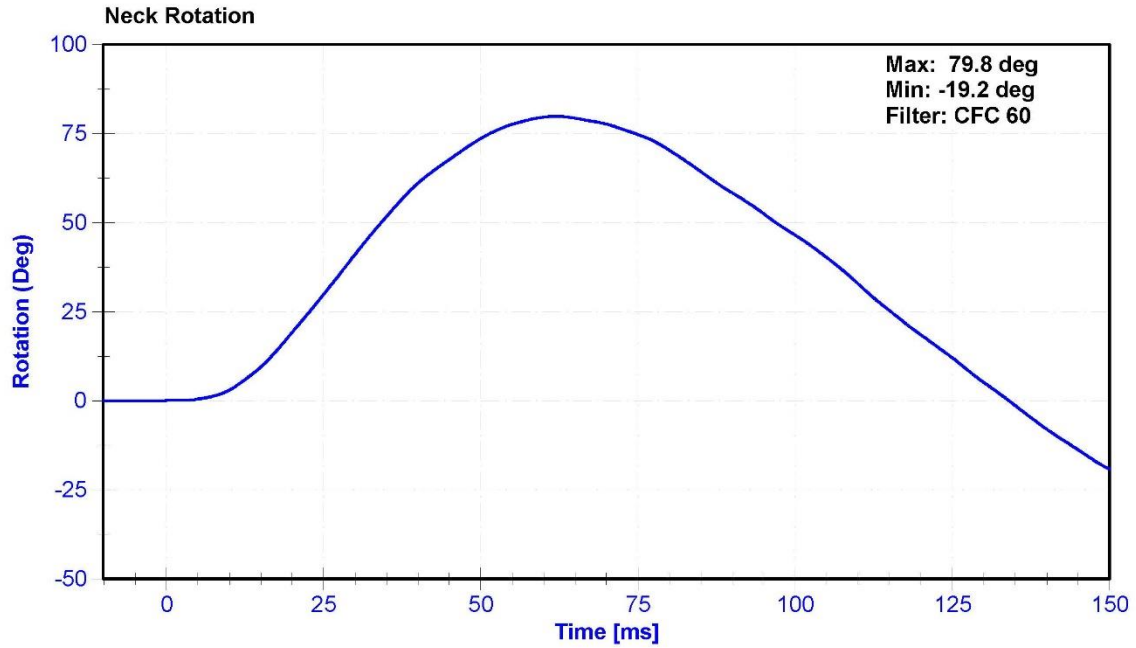
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.2	Pass
Humidity	10	70	%	40.6	Pass
Velocity	5.51	5.63	m/s	5.546	Pass
Pendulum Impulse at 10ms	2.2	2.8	m/s	2.47	Pass
Pendulum Impulse at 15ms	3.3	4.1	m/s	3.59	Pass
Pendulum Impulse at 20ms	4.4	5.4	m/s	4.80	Pass
Pendulum Impulse at 25ms	5.4	6.1	m/s	5.68	Pass
Pendulum Impulse from 25 to 100ms	5.5	6.2	m/s	5.82	Pass
Neck Rotation	71	81	deg	79.8	Pass
Time at Maximum Rotation	50	70	ms	61.9	Pass
Moment about the OC	36	44	Nm	42.7	Pass
Moment Decay to 0 Nm	102	126	ms	116.8	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7231CT	AC-AH5F3	5/11/2018	5/11/2019
Pendulum Potentiometer	Denton 78051-342	DS-184Pend	10/27/2017	10/27/2018
Condyle Potentiometer	Denton 78051-342	DS-185Pend	10/27/2017	10/27/2018
Upper Neck Load Cell	Denton 1716	LC-1872 FY	7/26/2017	7/26/2018





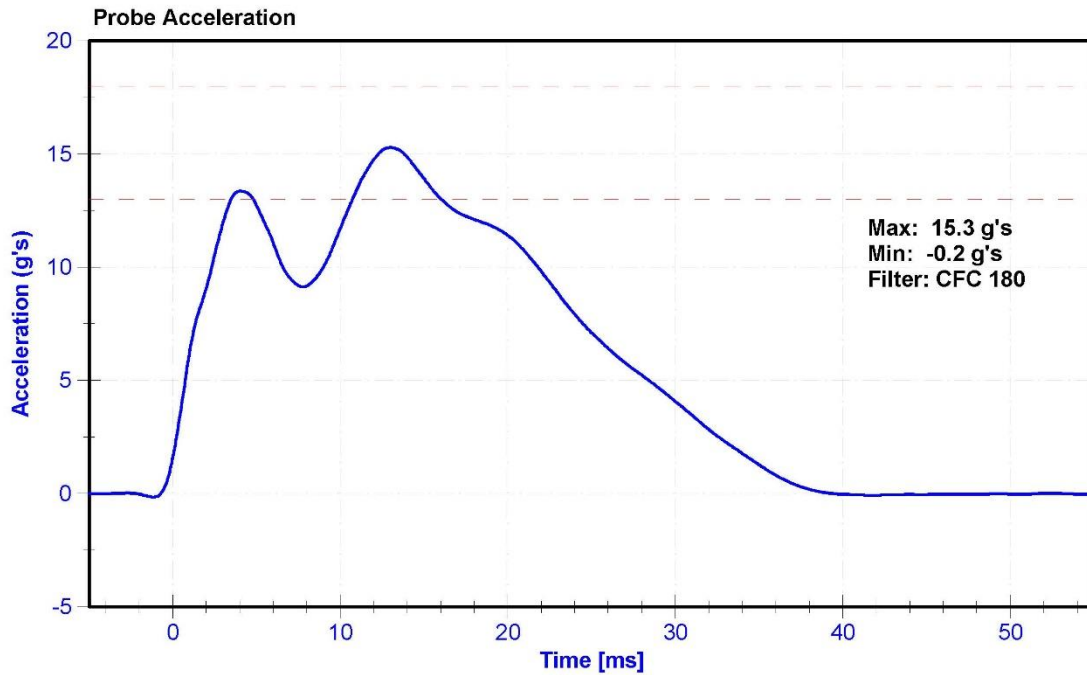
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

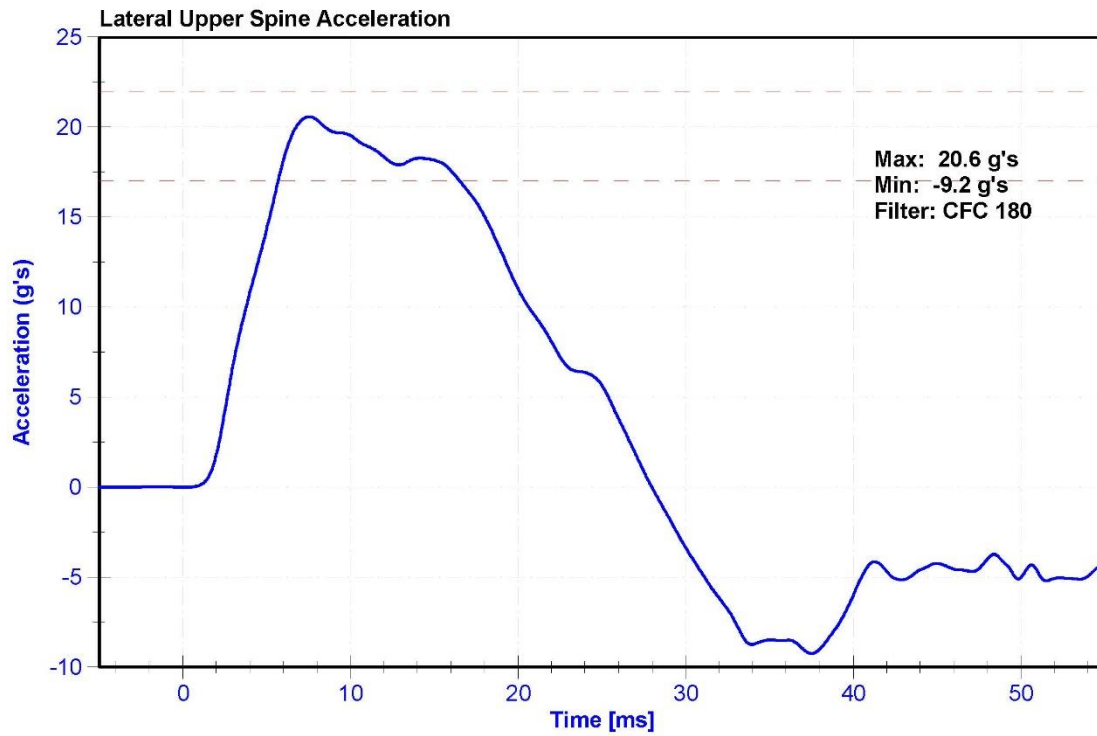
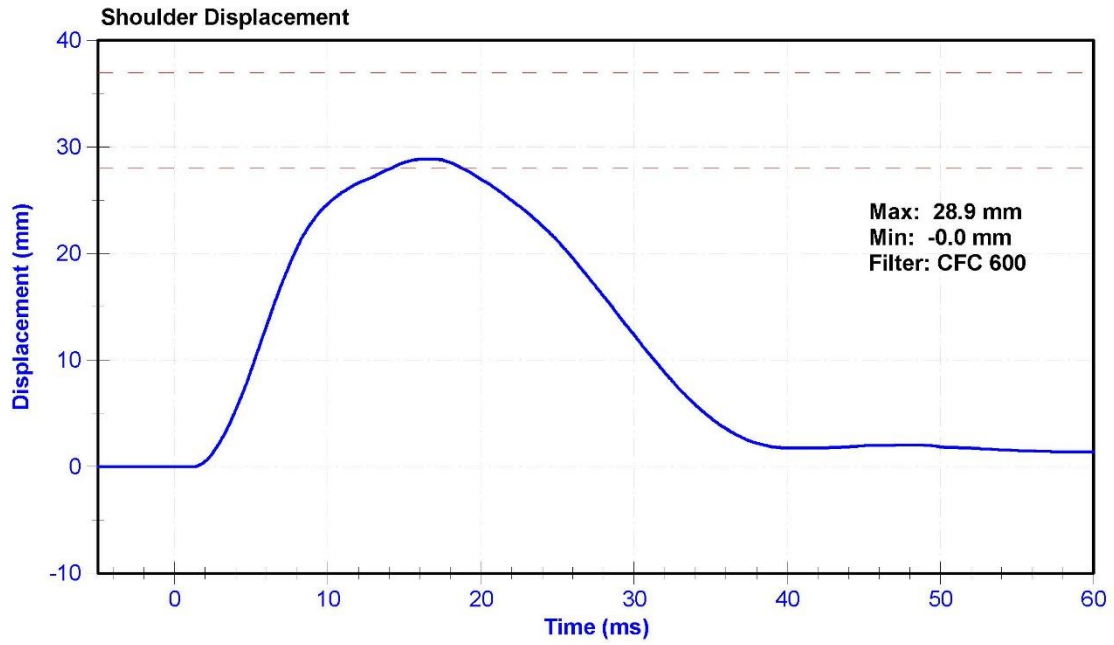
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	45.5	Pass
Velocity	4.2	4.4	m/s	4.39	Pass
Probe Acceleration	13	18	g's	15.3	Pass
Shoulder Deflection	28	37	mm	28.9	Pass
Lateral Upper Spine Acceleration	17	22	g's	20.6	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/27/2017	9/27/2018
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018





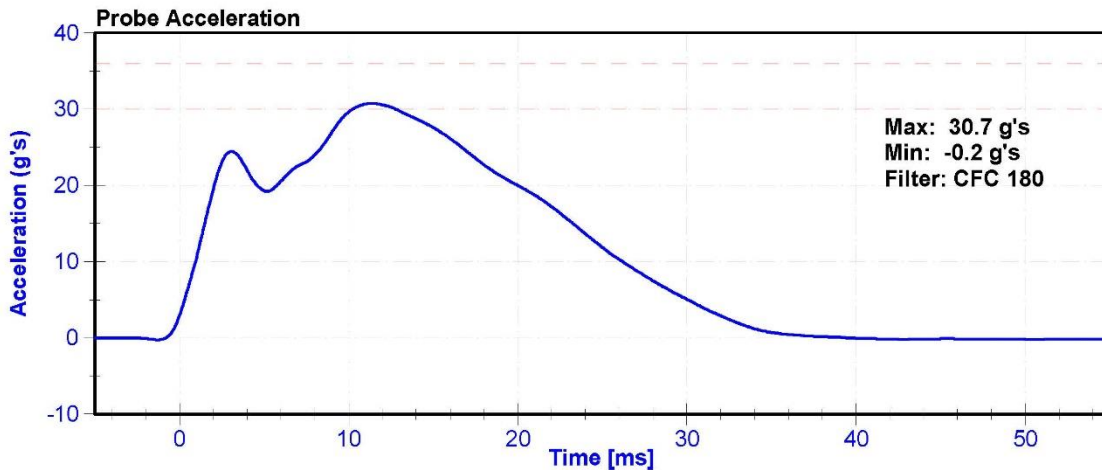
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

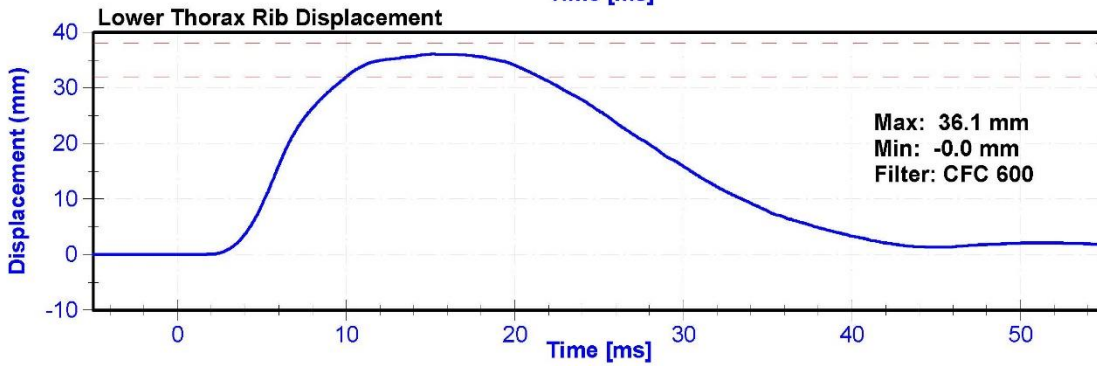
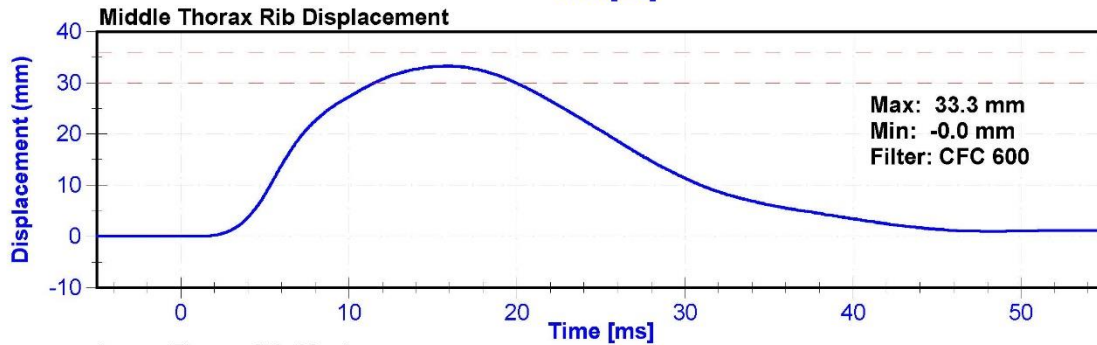
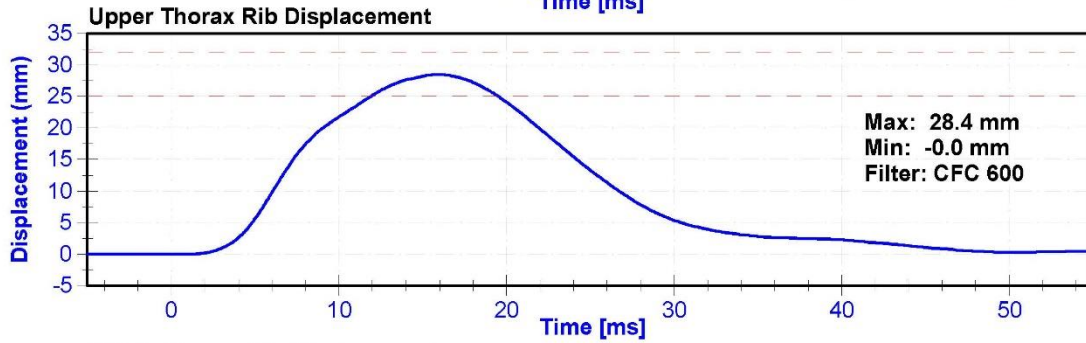
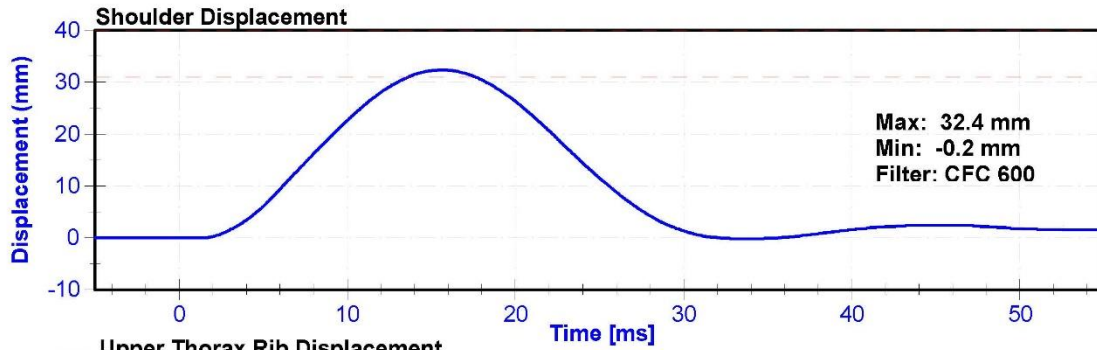
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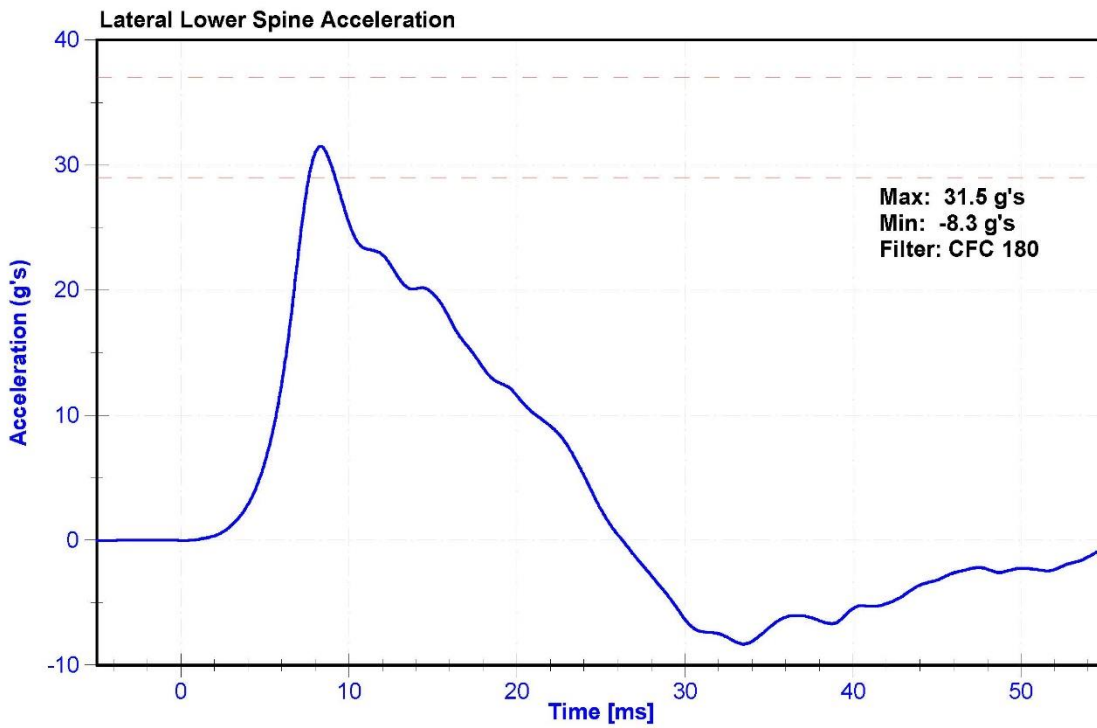
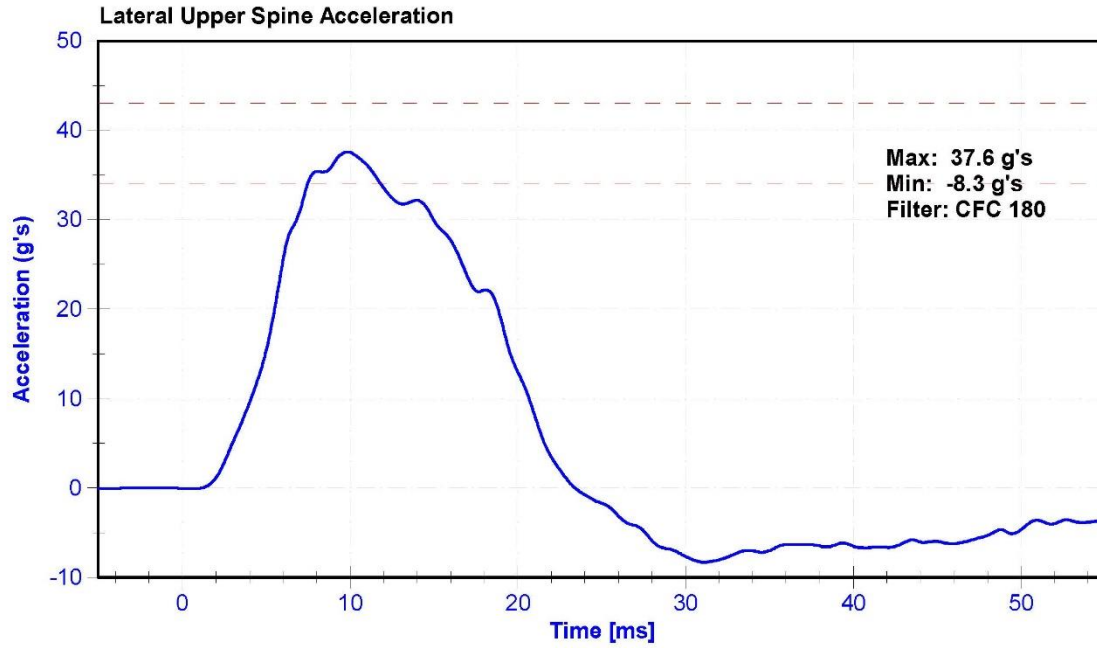
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	45.1	Pass
Velocity	6.6	6.8	m/s	6.79	Pass
Probe Acceleration after 5 ms	30	36	g's	30.7	Pass
Lateral Upper Spine Acceleration	34	43	g's	37.6	Pass
Lateral Lower Spine Acceleration	29	37	g's	31.5	Pass
Shoulder Deflection	31	40	mm	32.4	Pass
Upper Thorax Rib Deflection	25	32	mm	28.4	Pass
Mid Thorax Rib Deflection	30	36	mm	33.3	Pass
Lower Thorax Rib Deflection	32	38	mm	36.1	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine T1 Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018
Upper Spine T12 Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Shoulder Potentiometer	Servo 08TC1-3745	DS-1845GFE	9/27/2017	9/27/2018
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	12/11/2017	12/11/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/27/2017	9/27/2018







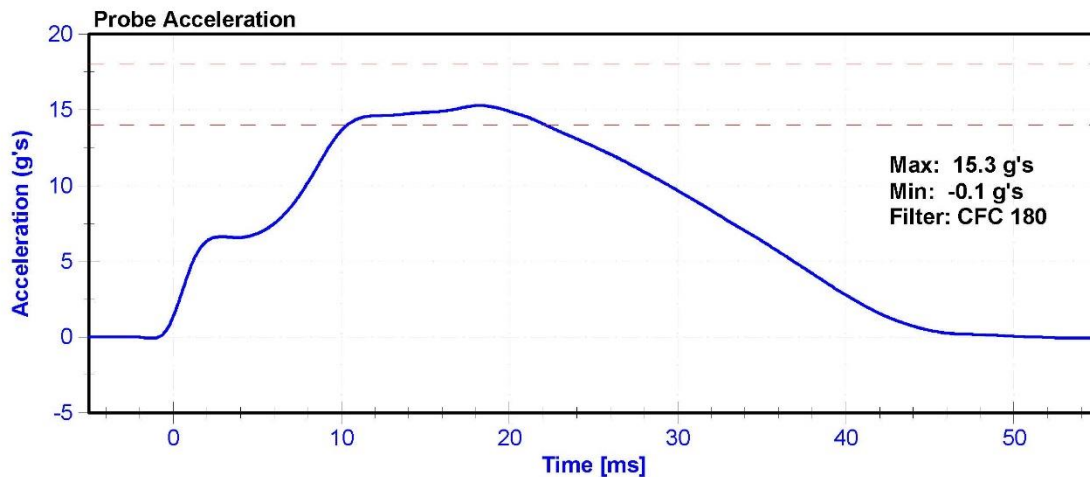
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

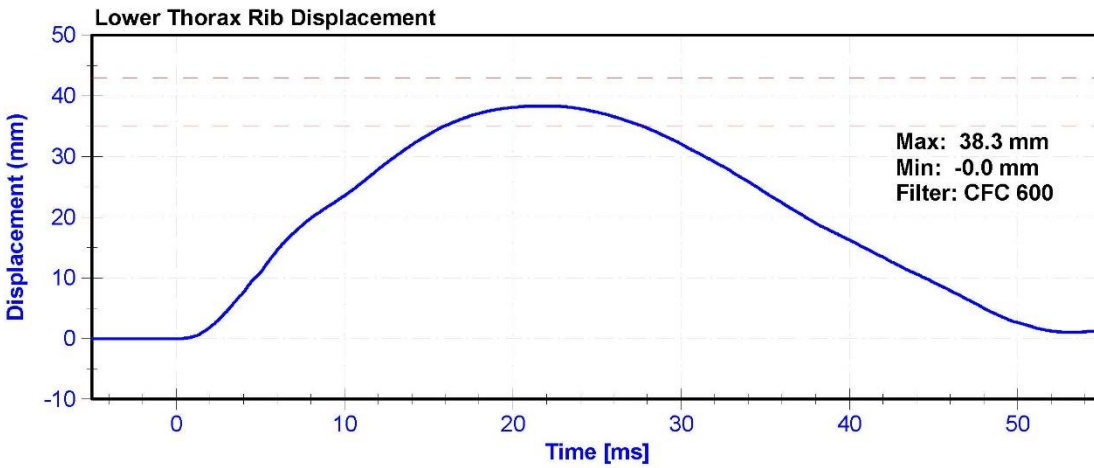
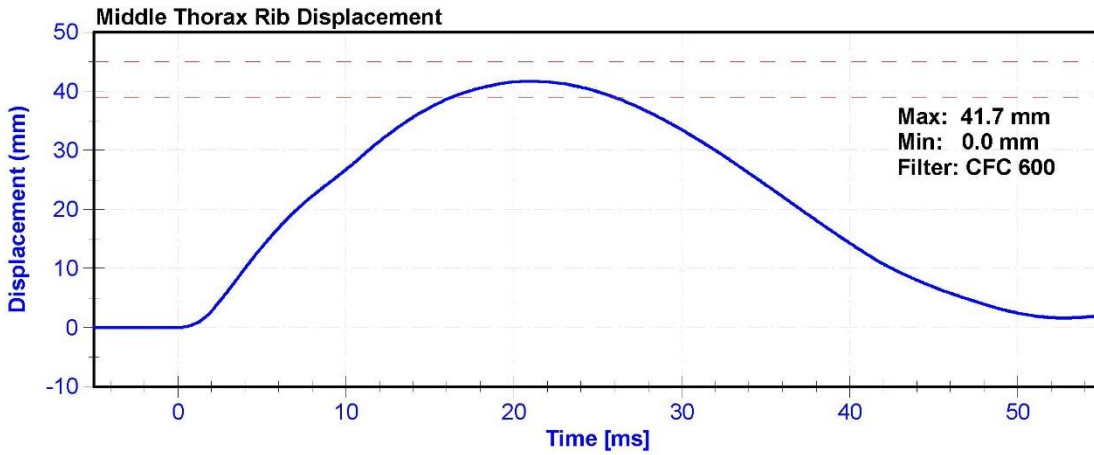
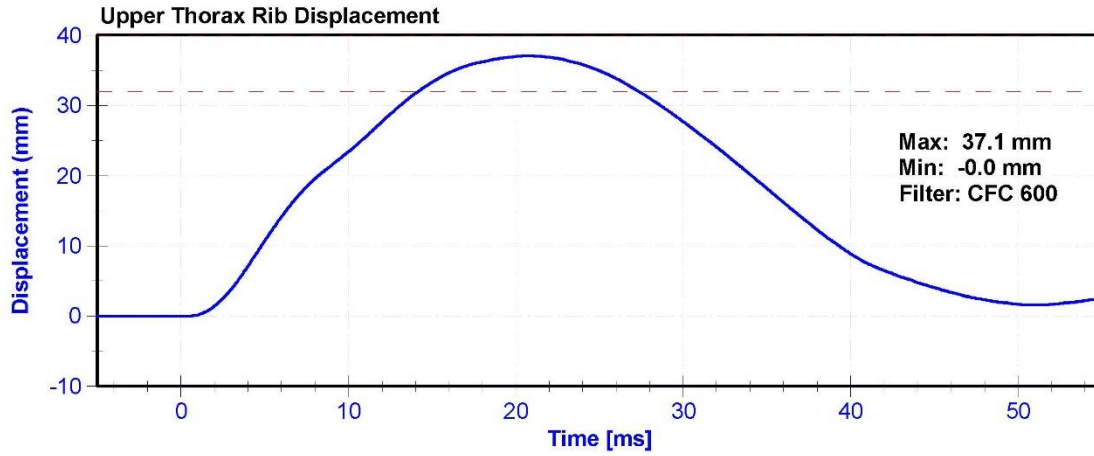
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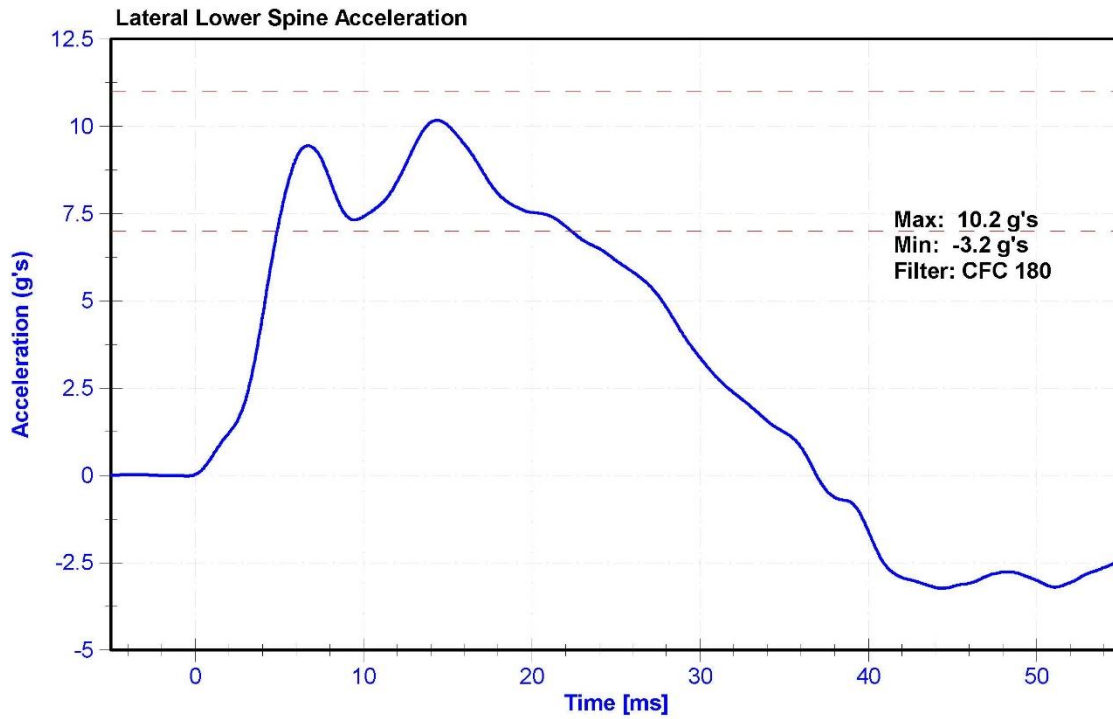
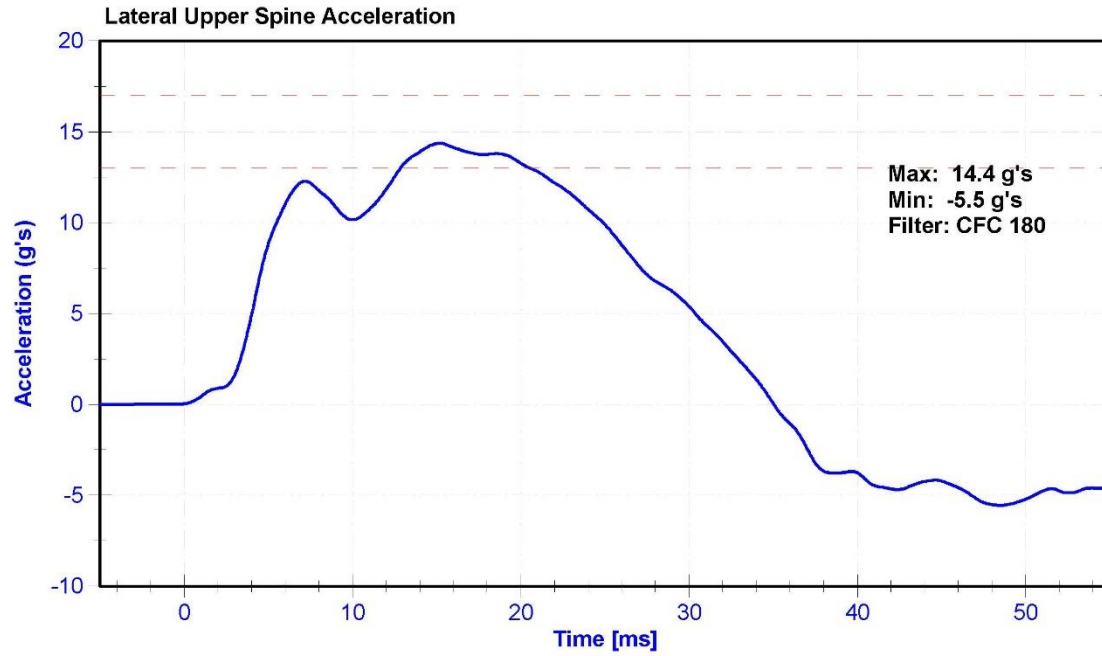
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22	Pass
Humidity	10	70	%	46.3	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	14	18	g's	15.3	Pass
Lateral Upper Spine Acceleration	13	17	g's	14.4	Pass
Lateral Lower Spine Acceleration	7	11	g's	10.2	Pass
Upper Thorax Rib Deflection	32	40	mm	37.1	Pass
Middle Thorax Rib Deflection	39	45	mm	41.7	Pass
Lower Thorax Rib Deflection	35	43	mm	38.3	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Upper Spine Y Accelerometer	ENDEVCO 7264CT	AC-P63561	5/4/2018	11/2/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Upper Thorax Rib Potentiometer	Servo 1246	DS-2165GFE	5/15/2018	5/15/2019
Middle Thorax Rib Potentiometer	Servo 08TC1-3621	DS-45 GFE	12/11/2017	12/11/2018
Lower Thorax Rib Potentiometer	Servo 08TC1-3787	DS-011GFE	9/27/2017	9/27/2018







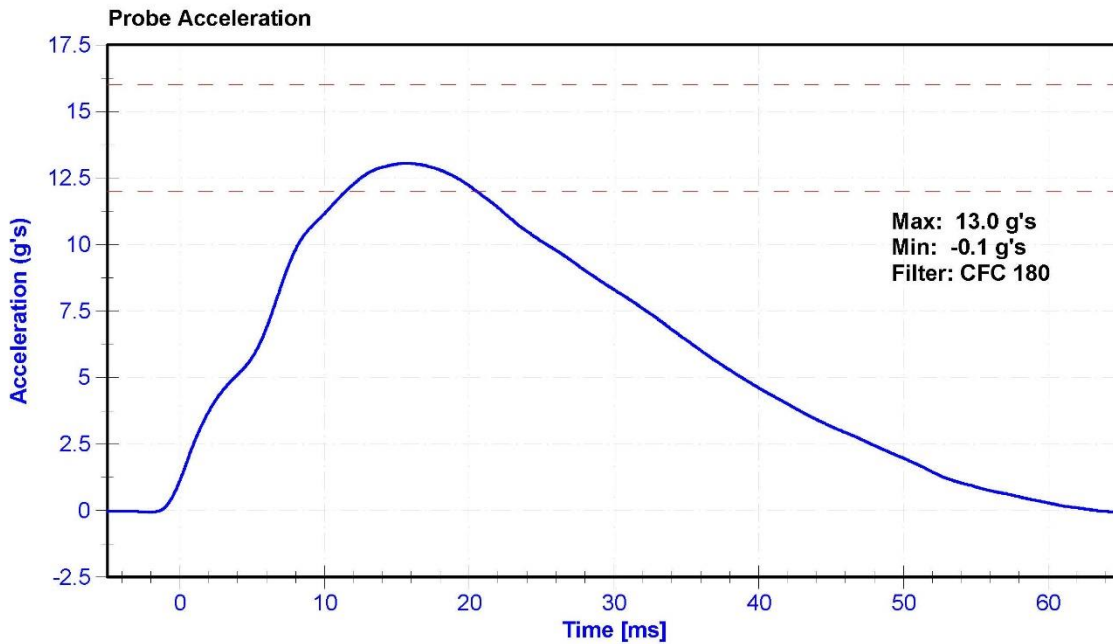
ATD Manufacturer	FTSS	Test Technician	D. Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

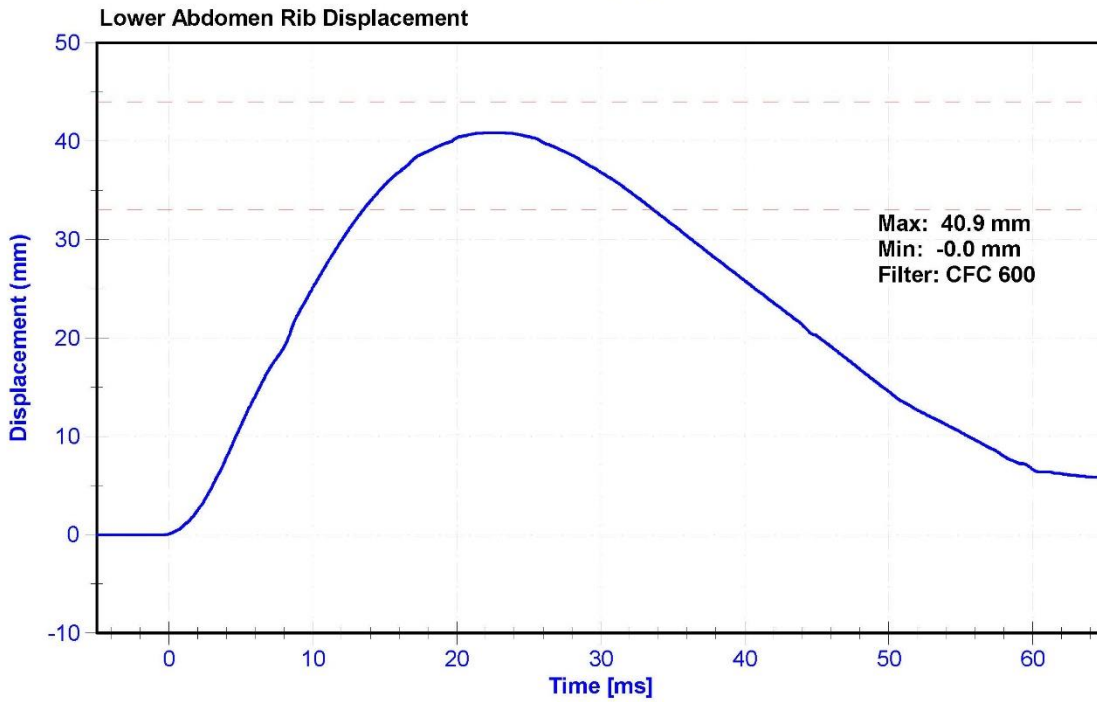
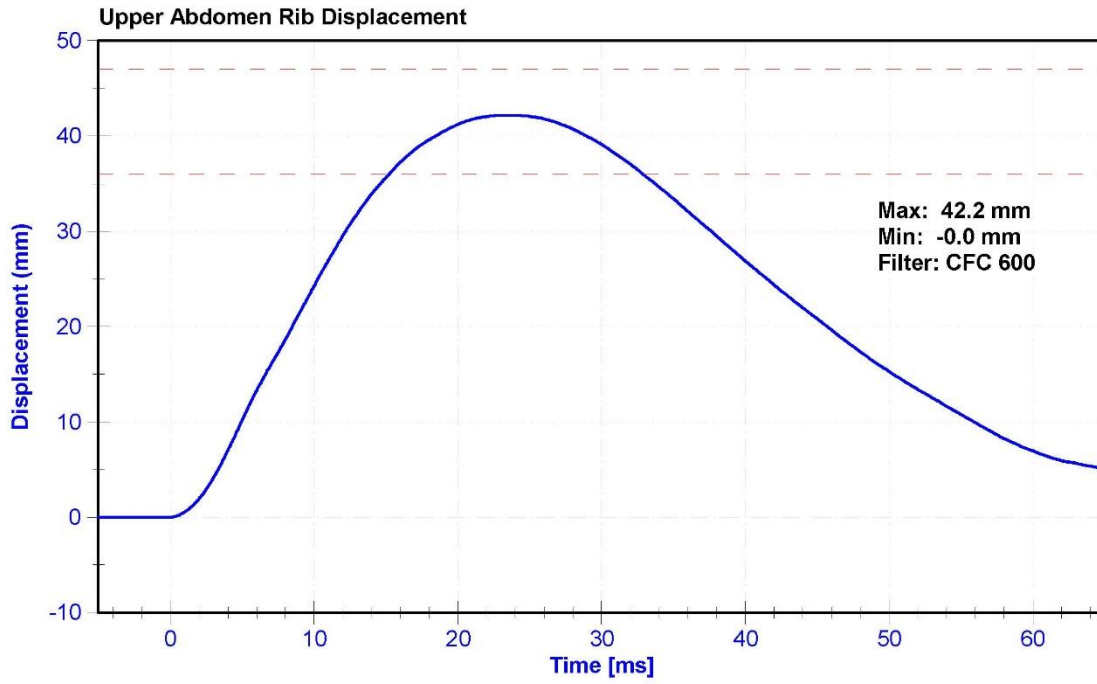
**Results**

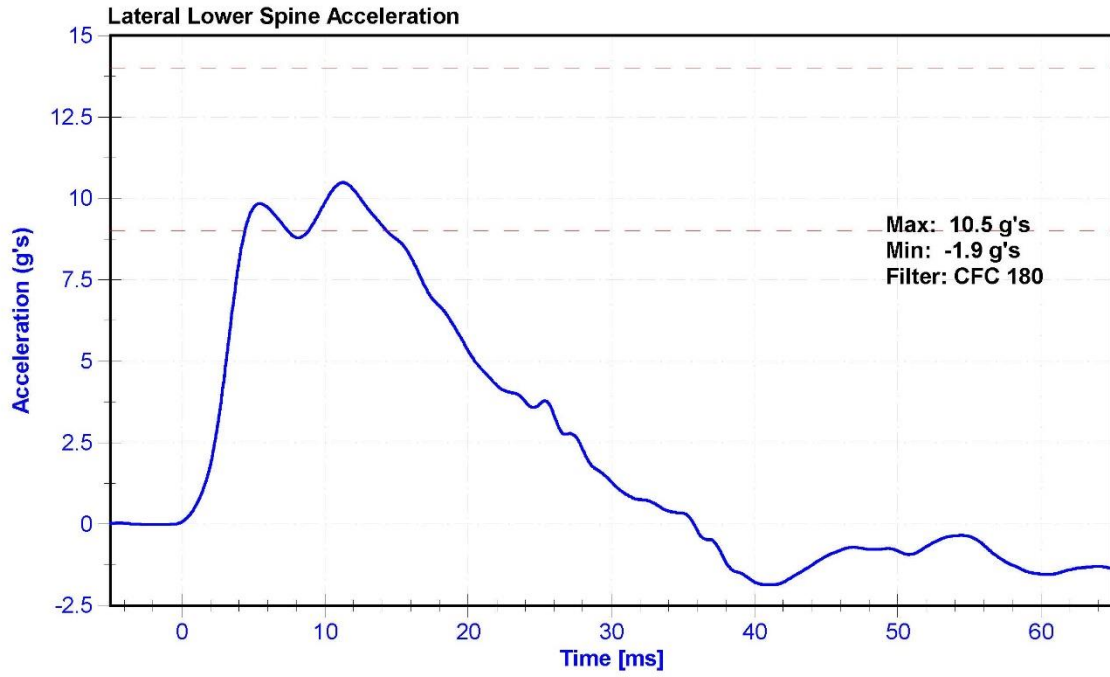
Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.6	Pass
Humidity	10	70	%	48.4	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	12	16	g's	13.0	Pass
Lateral Lower Spine Acceleration	9	14	g's	10.5	Pass
Upper Abdomen Rib Deflection	36	47	mm	42.2	Pass
Lower Abdomen Rib Deflection	33	44	mm	40.9	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Probe Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Lower Spine Y Accelerometer	ENDEVCO 7264	AC-P83319	5/4/2018	11/2/2018
Upper Abdomen Rib Potentiometer	Servo 08TC1-3725	DS-008GFE	9/27/2017	9/27/2018
Lower Abdomen Rib Potentiometer	Servo 08TC1-3745	DS-1774GFE	9/27/2017	9/27/2018







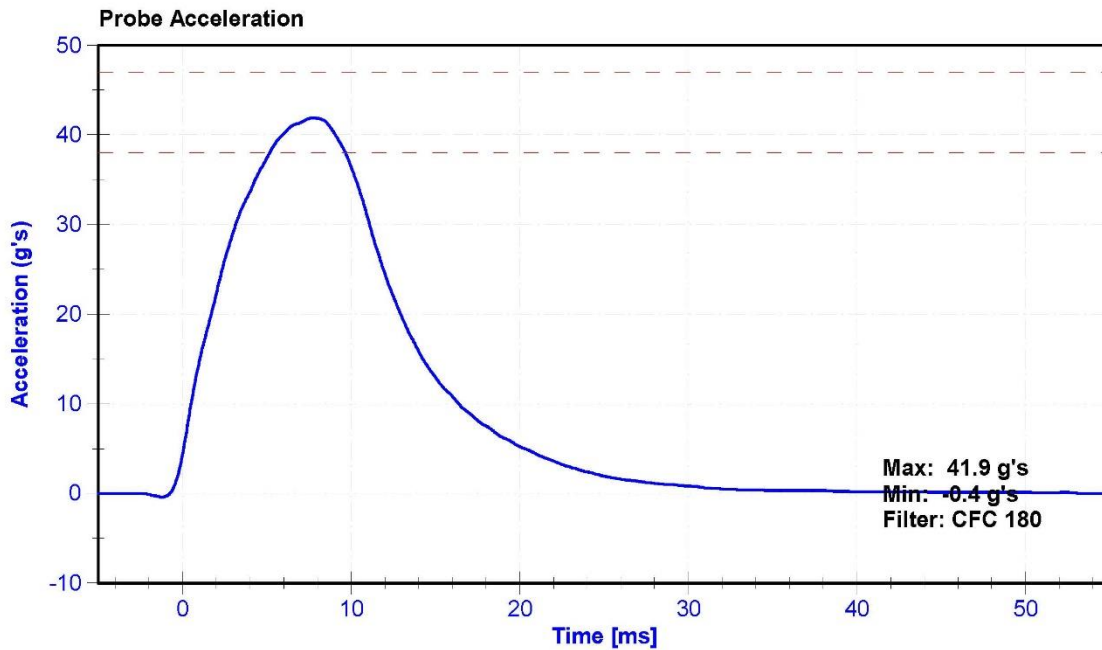
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K. Brogan

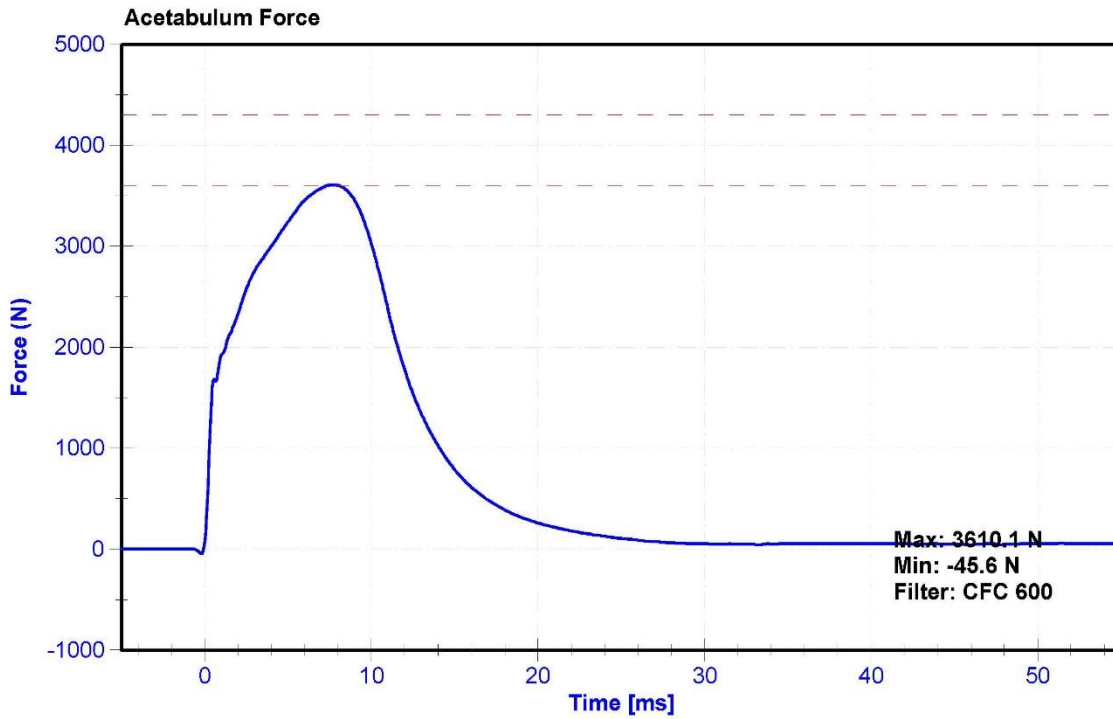
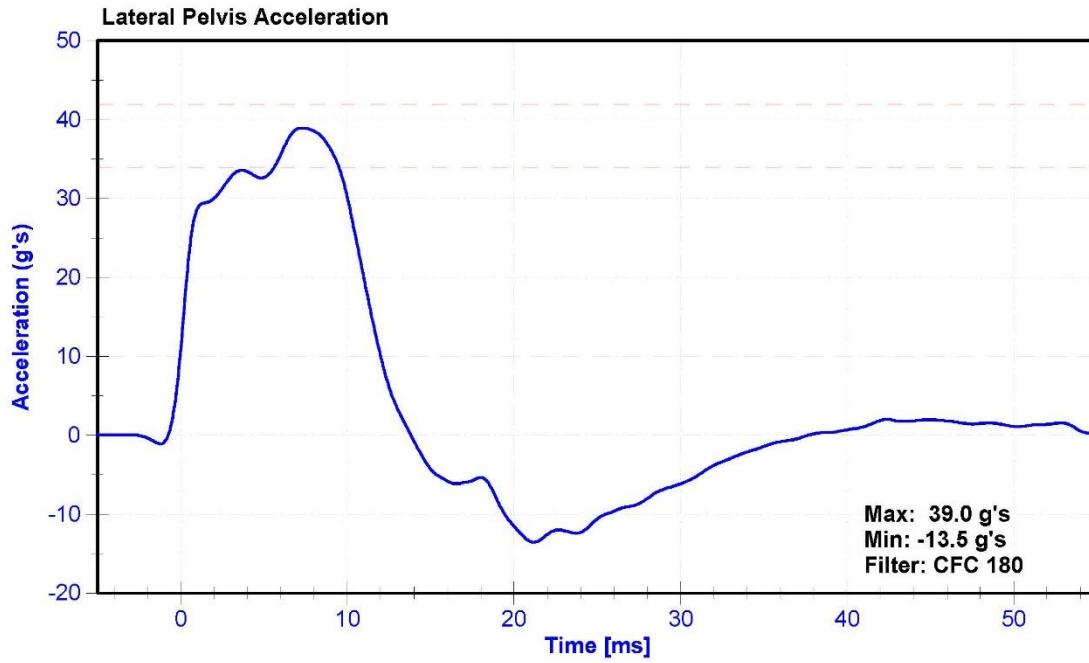
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	22.1	Pass
Humidity	10	70	%	39.9	Pass
Velocity	6.6	6.8	m/s	6.66	Pass
Probe Acceleration	38	47	g's	41.9	Pass
Lateral Pelvis Acceleration after 6ms	34	42	g's	39.0	Pass
Acetabulum Force	3600	4300	N	3610.1	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	5/4/2018	11/2/2018
Acetabulum Load Cell	Denton 3249J	LC-4986Fy	6/4/2018	6/4/2019
Certification Plug	Humanetics	12110	02/27/2018	N/A
Crash Test Plug	Humanetics	11473	08/30/2016	N/A





DG8012 crash 6/12/2018



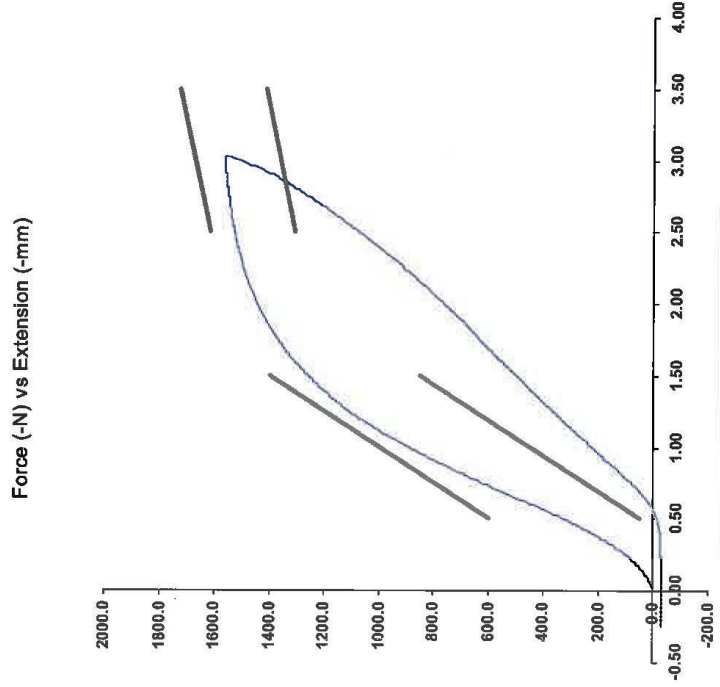
**SID-11s Pelvis Plug Certification Test**

Plug S/N 11473  
 Test Number 2961  
 Report Number 2958  
 Test Date 8/30/2016 11:36:03 AM

Test Results	Spec. Min	Spec. Max
Force @ 0.5 mm (N)	50.00	600.00
Force @ 1.5 mm (N)	850.00	1,400.00
Force @ 2.5 mm (N)	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,361.00	1,673.00

Testing Machine STM-20 5965542  
 Load Cell S/N (T1240813), Units (LBS) 1000  
 Crosshead Speed (mm / min ) or Rate 12.7  
 Extension or Position Measured by XHD\_100 ( XHD/100 )

Notes:



Operator DC  
 Part Number 180-4450

Template No 107 30-Aug-16  
 SACO Research

BY: DC Date: 8/30/16  
 SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

DG8012 cert 6/12/2018



**SID-11s Pelvis Plug Certification Test**

Plug S/N 12110

Test Number 6468

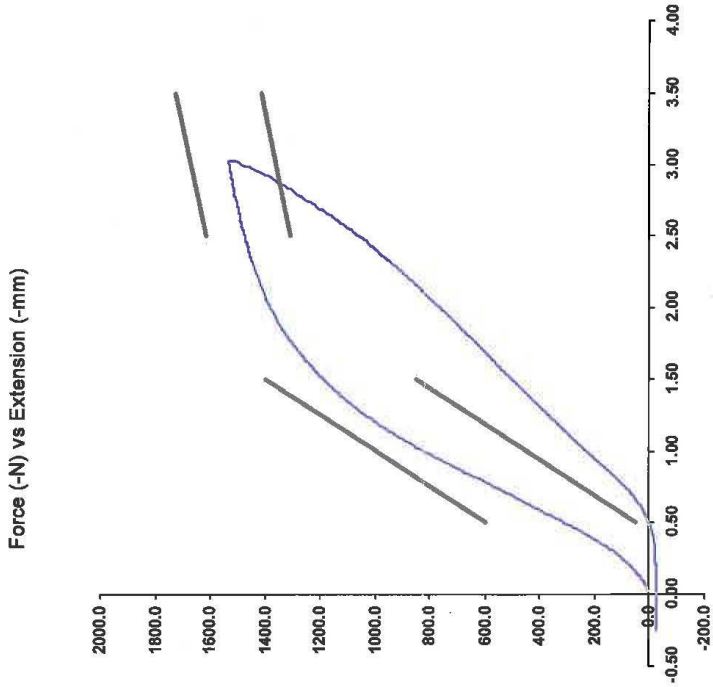
Report Number 6483

Test Date 2/27/2018 11:23:30 AM

Test Results	Spec. Min	Spec. Max
Force @ 0.5 mm (N)	50.00	600.00
Force @ 1.5 mm (N)	850.00	1,400.00
Force @ 2.5 mm (N)	1,306.00	1,618.00
Force @ 3.0 mm (N)	1,361.00	1,673.00

Testing Machine STM-20 5965542  
 Load Cell S/N (F1360947), Units (LBS) 1000  
 Crosshead Speed (mm / min) or Rate 12.7  
 Extension or Position Measured by XHD\_100 (XHD100)

Notes:



Operator \_\_\_\_\_  
 Part Number 180-4450

Template No 107 27-Feb-18  
 SACO Research

By: DC Date: 2/27/18

SACO Research 41735 Elm St, #401 Murrieta, CA 92562 Tel 310-694-2082 FAX

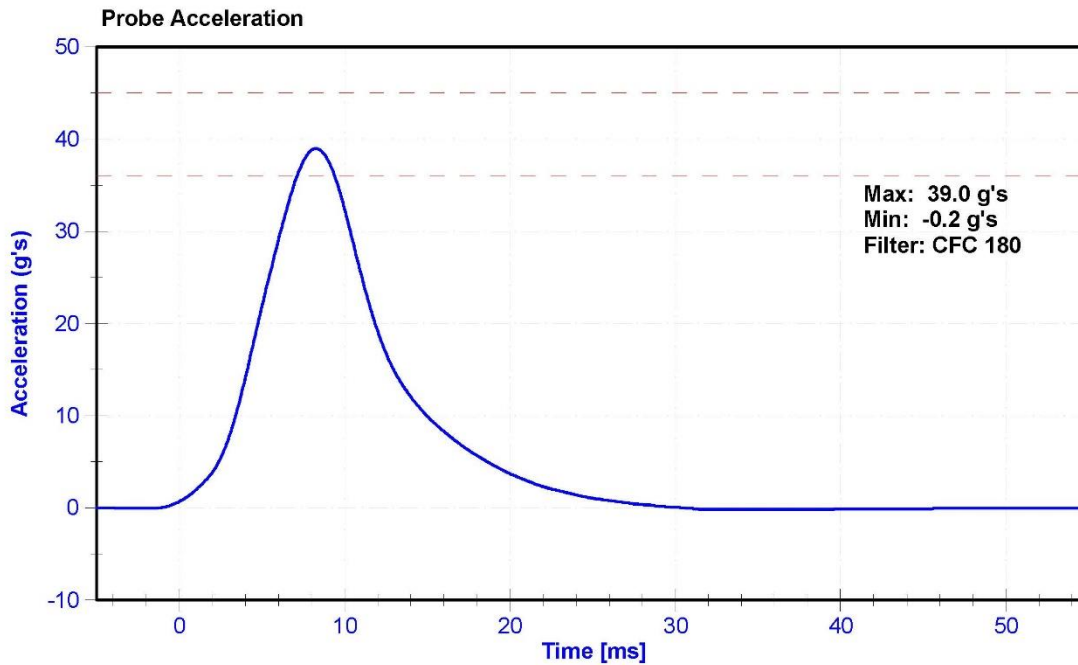
ATD Manufacturer	FTSS	Test Technician	D.Reinhard
ATD Serial Number	DG8012	Laboratory Supervisor	K.Brogan

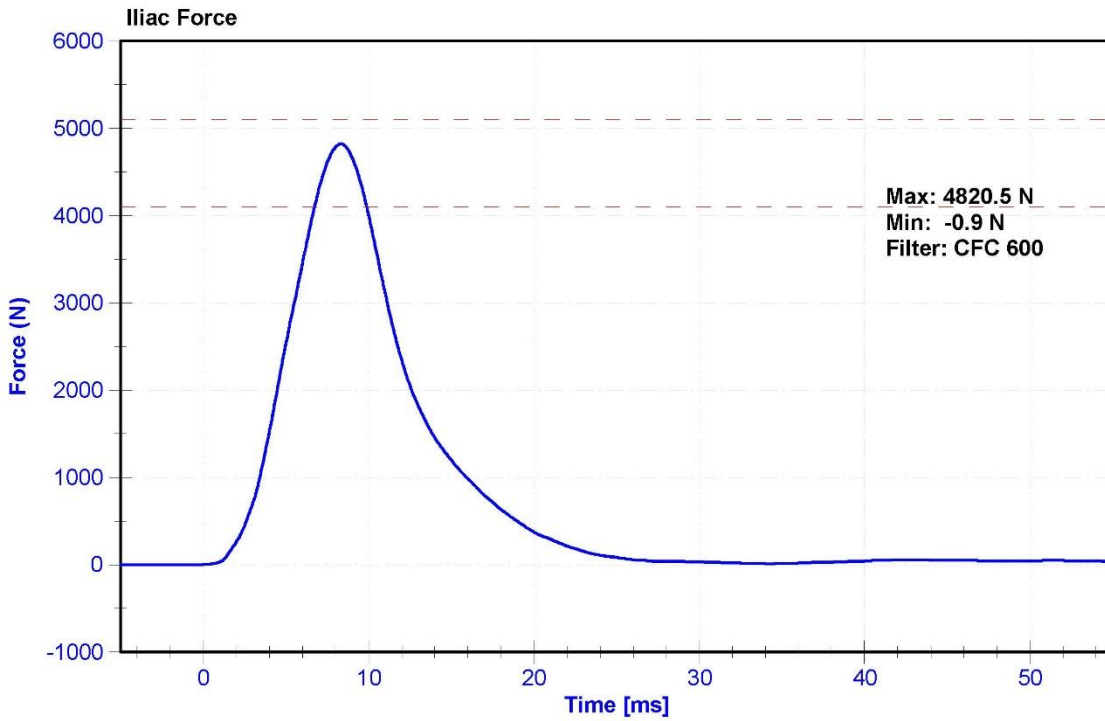
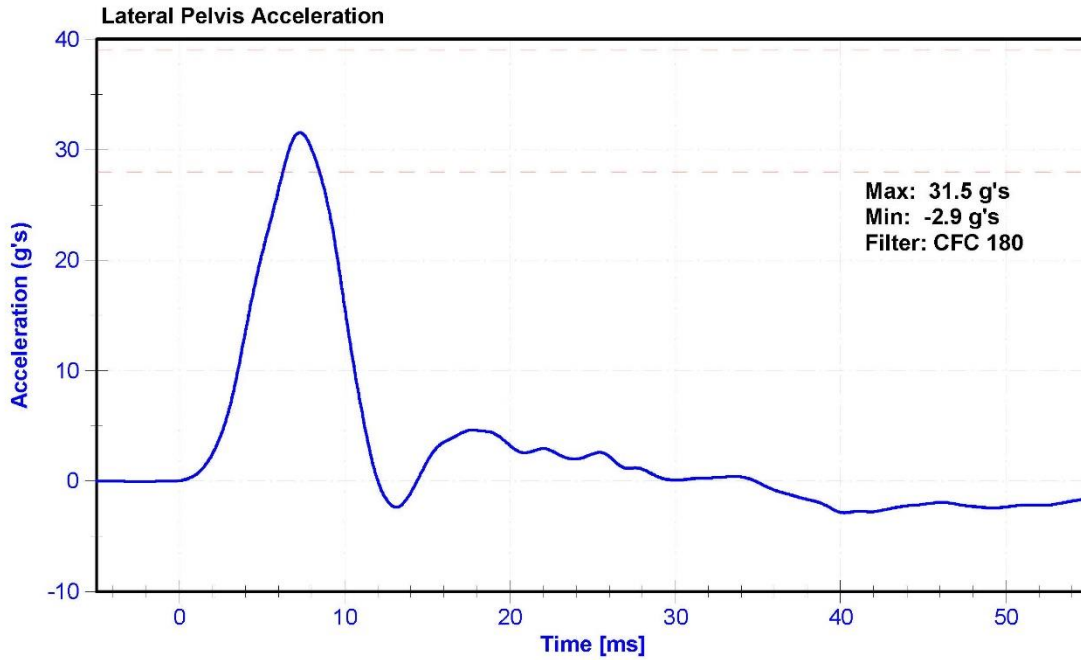
**Results**

Test Parameter	Minimum Specification	Maximum Specification	Unit	Result	Pass/Fail
Temperature	20.6	22.2	°C	21.3	Pass
Humidity	10	70	%	44.1	Pass
Velocity	4.2	4.4	m/s	4.37	Pass
Probe Acceleration	36	45	g's	39.0	Pass
Lateral Pelvis Acceleration	28	39	g's	31.5	Pass
Iliac Force	4100	5100	N	4820.5	Pass

**Transducer Calibrations**

Channel	Manufacturer	Serial Number	Calibration Date	Calibration Due Date
Pendulum Accelerometer	ENDEVCO 7264CT	AC-P32453	10/17/2017	10/17/2018
Pelvis Y Accelerometer	ENDEVCO 7264CT	AC-P51875	5/4/2018	11/2/2018
Iliac Load Cell	DENTON 3228J	LC-113Fy	6/4/2018	6/4/2019





**APPENDIX D**

**TEST EQUIPMENT AND INSTRUMENTATION CALIBRATION DATA**

**Table 1 – Dummy Instrumentation (SID-IIs)**

			SID-IIs S/N: DG8012			
			Serial Number	Manufacturer	Calibration Date	
Head Accelerometers			X	AC-P51685	ENDEVCO	5/4/2018
			Y	AC-P51682	ENDEVCO	5/4/2018
			Z	AC-P51699	ENDEVCO	5/4/2018
Head Accelerometers - Redundant			X	AC-P51701	ENDEVCO	5/4/2018
			Y	AC-P45019	ENDEVCO	5/4/2018
			Z	AC-P51690	ENDEVCO	5/4/2018
Displacement Potentiometer	Shoulder					
	Thoracic Rib	Upper	Y	DS-2165GFE	Servo	5/15/2018
		Middle	Y	DS-45 GFE	Servo	12/11/2017
		Lower	Y	DS-011GFE	Servo	9/27/2017
	Abdominal Rib	Upper	Y	DS-008GFE	Servo	9/27/2017
		Lower	Y	DS-1774GFE	Servo	9/27/2017
Lower Spine Accelerometers (T12)			X	AC-P74788	ENDEVCO	5/4/2018
			Y	AC-P83319	ENDEVCO	5/4/2018
			Z	AC-P83432	ENDEVCO	5/4/2018
Acetabulum Load Cell			Y	LC-4986Fy	Denton	6/4/2018
Lilac Wing Load Cell			Y	LC-113Fy	Denton	6/4/2018
Pelvis Plug (Struck Side)				11436	SACO	8/29/2016
Pelvis Plug (Non-Struck Side)						

**Table 2 – Vehicle Instrumentation**

Vehicle Instrumentation		Serial Number	Manufacturer	Calibration Date
Vehicle Center of Gravity	X	AC-A192226	MSI 1201-1000	3/19/2018
Vehicle Center of Gravity	Y	AC-A217548	MSI 1201-1000	3/19/2018
Vehicle Center of Gravity	Z	AC-A217568	MSI 1201-1000	4/3/2018
Left Floor Sill	Y	AC-A189595	MSI 1201-1000	4/28/2018
A-Pillar Sill	Y	AC-A247205	MSI 1201-1000	12/13/2017
A-Pillar Low	Y	AC-A247190	MSI 1201-1000	12/13/2017
A-Pillar Mid	Y	AC-A250384	MSI 1201-1012	1/17/2018
B-Pillar Sill	Y	AC-A197025	MSI 1201-1000	3/13/2018
B-Pillar Low	Y	AC-A247200	MSI 1201-1000	4/18/2018
B-Pillar Mid	Y	AC-A247196	MSI 1201-1000	4/18/2018
Driver Seat	Y	AC-A250372	MSI 1201-1000	1/17/2018
Engine Top	X	AC-A247191	MSI 1201-1000	12/13/2017
Engine Top	Y	AC-A250343	MSI 1201-1000	1/17/2018
Firewall	Y	AC-A196999	MSI 1201-1000	4/3/2018
Right Roof	Y	AC-A247197	MSI 1201-1000	5/9/2018
Right Floor Sill	Y	AC-A192219	MSI 1201-1000	5/9/2018
Rear Floorpan	X	AC-A217559	MSI 1201-1000	4/3/2018
Rear Floorpan	Y	AC-A222646	MSI 1201-1000	4/3/2018

**Table 3 – Pole Instrumentation**

Pole Instrumentation	Serial Number	Manufacturer	Calibration Date
Load Cell 1	LC-18879	Interface 1220-FS	6/19/2017
Load Cell 2	LC-18852	Interface 1220-FS	6/19/2017
Load Cell 3	LC-46955	Interface 1220-FS	6/19/2017
Load Cell 4	LC-18882	Interface 1220-FS	6/19/2017
Load Cell 5	LC-18864	Interface 1220-FS	6/19/2017
Load Cell 6	LC-18847	Interface 1220-FS	6/19/2017
Load Cell 7	LC-62086	Interface 1220-FS	6/19/2017
Load Cell 8	LC-46962	Interface 1220-FS	6/19/2017